

ORIGINS OF GEMOLOGY IN PICTURES



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CAROL DeYOUNG

April 10, 1976

We of J. & S.S. DeYoung, Inc., welcome you to Boston on the occasion of the 1976 Conclave of the American Gem Society.

In this our country's bicentennial year, while rediscovering the beginnings of this great democracy, we felt it would be appropriate to also trace the beginnings of gemology through historic black-and-white prints as presented in this compilation.

This publication has been prepared with considerable thought and effort by Joseph O. Gill, gemologist of our firm, from his extensive library of several thousand publications exclusively on gems, including rare books dating from 1632 when the first book on gems in English was published. Mr. Gill has selected some of the rarest and most noteworthy prints from his library and with his accompanying text has uniquely described the origins of our industry.

We know you will find it both enlightening and entertaining.

Sydney DeYoung
Sydney DeYoung

ORIGINS OF GEMOLOGY IN PICTURES

Historical and Notable Prints from an Exclusive Library on Gems



(1)

A view of the diamond district of Brazil, circa, 1755

by Joseph O. Gill, CG, FGA
gemologist of DeYoung

Joseph O. Gill

Note: The numbers by the pictures refer to the source of the print, found in the bibliography at the end of this publication.

A
 LAPIDARY
 OR,
 THE HISTORY
 OF
 PRETIOUS STONES:

With cautions for the undeceiving of
 all those that deal with
Pretious Stones.

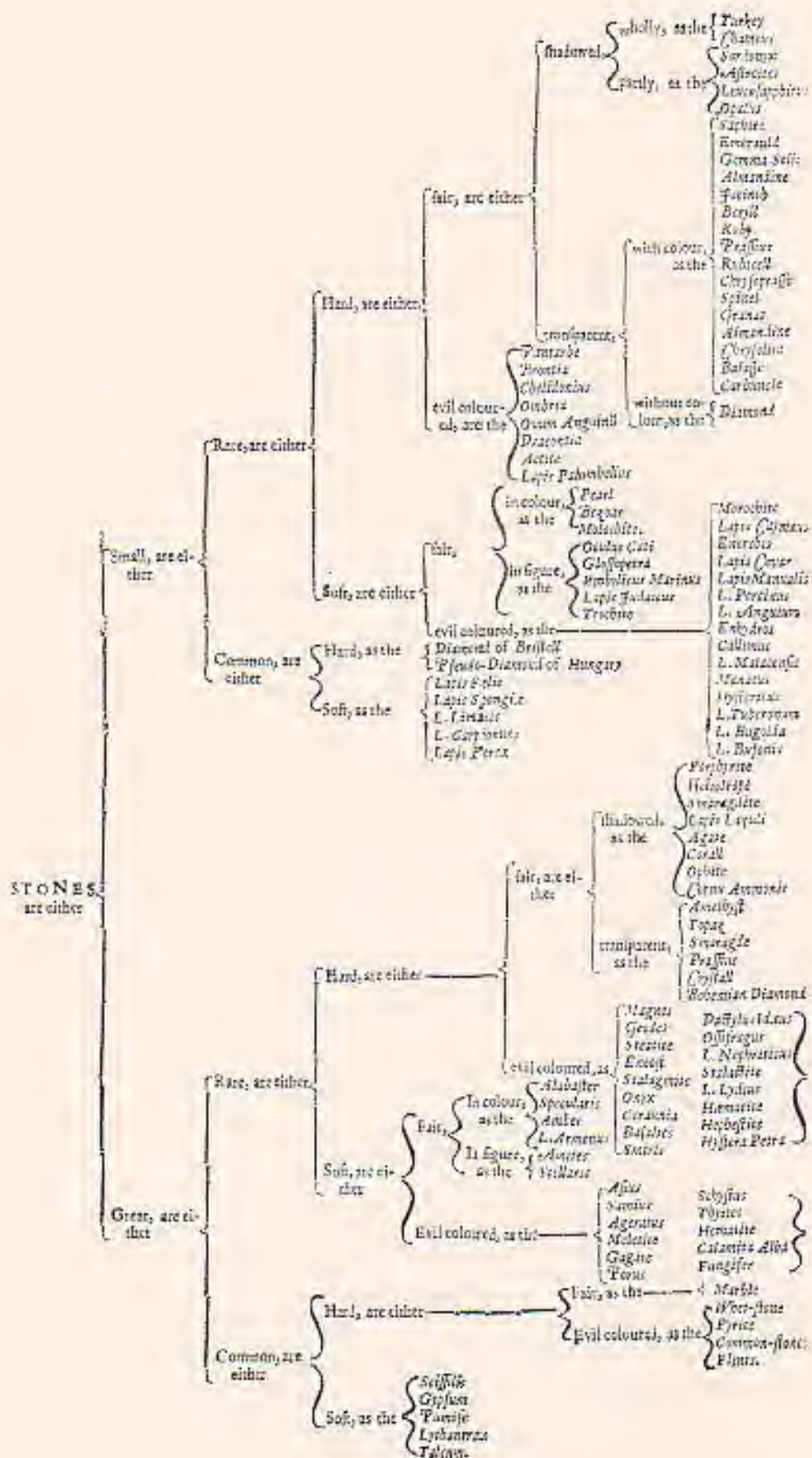
By THOMAS NICOLS,
 sometimes of Jesus-Colledge,
 CAMBRIDGE.

Inest sua gratia parvis.

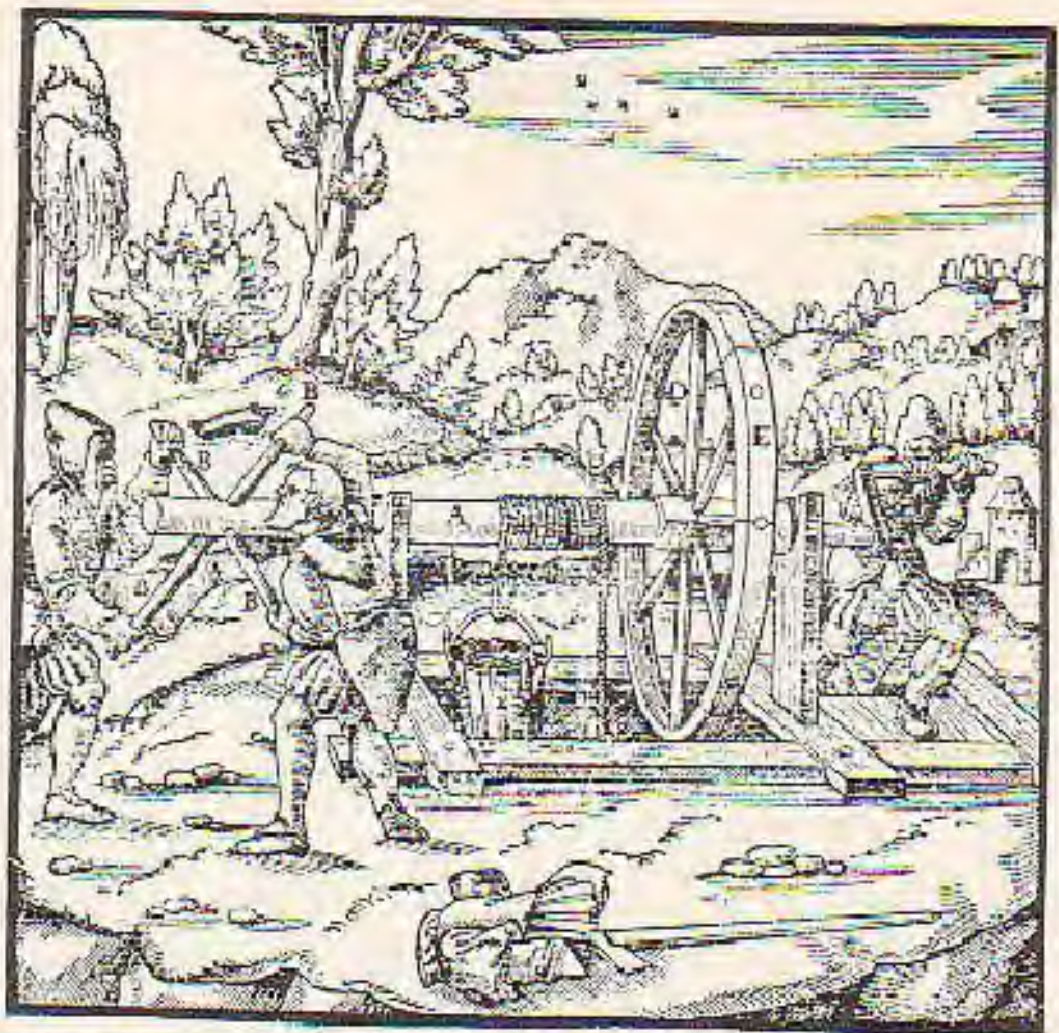
CAMBRIDGE:
 Printed by THOMAS BUCK, Printer to
 the University. 1652.

A 2.

This frontispiece represents the start of the very first account of gems in English. The book was so popular and well-used that most copies were worn out; this first edition has been very rare for over 100 years. The book gives a thorough account of superstition, lapidary, and the science of gems. The first attempt at putting gems into a system of classification was one of the more important contributions of this book, and a copy of this classification is shown on the next page. It is based on physical characteristics and superstitions with no regard to chemistry, which is now the main criterion for a classification of gems.



[3]



These two plates illustrate the mining methods of the 13th to the 17th century and are taken from a translation of a Latin work of 1556 which contains several

hundred such prints. This book was so outstanding that it was used as the only source for mining engineers throughout Europe for over 200 years.



[3]



a



b

(4)



c



d



e



f

3"
SCALE

The first gems were undoubtedly found as pebbles along rivers and near the oceans. Later, man learned to use tools to chip the rocks as shown above. He also built fires on the rocks to heat them, then put cold water on them causing them to shatter. They would also put water in cracks, and when it froze the rock would split. At a later time dried corn was put into the cracks, then water, causing the corn to swell and the rock to crack.

These methods were in use as recently as 50 years ago in some remote parts of the world.

It has been stated by many authorities that when Columbus came to the New World the mining methods were more advanced than those then in use in Europe.

MANI MĀLA

मणि माला

(5)

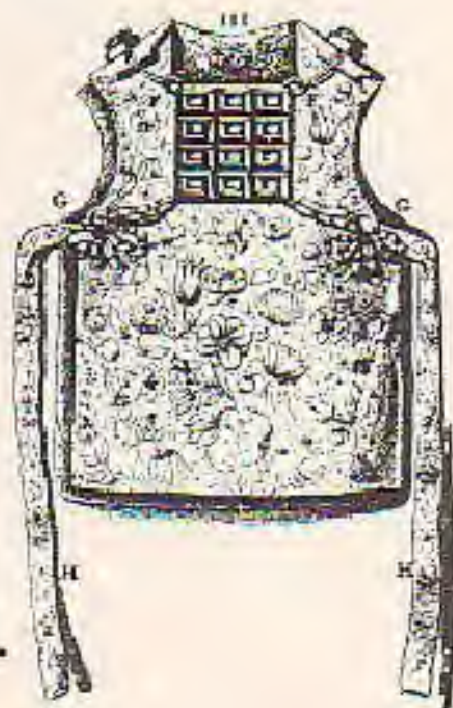
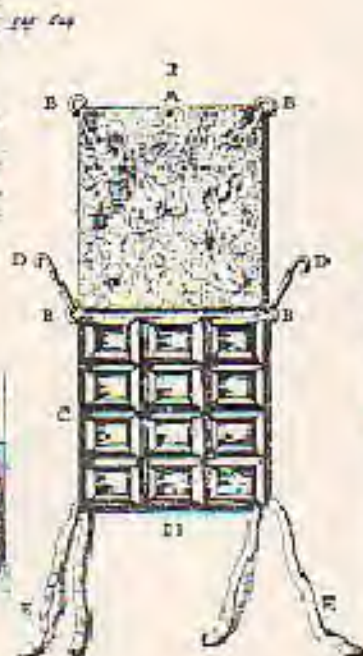


This necklace of gems represents the circle of gem superstitions and is the only illustration in this indispensable two-volume work of over 1000 pages. The book translates many of the old Sanskrits on Indian occultism and philosophy. There is a complete account of the class structure of the gems as individuals and their inter-relating powers.

(6)



(7)



(6)

Aaron, covered in vestments wrought with gold, purple and scarlet, as he stands before the altar of God. He bears over his heart the jeweled breastplate whose twelve precious stones, each one dedicated to a tribe of Israel, are mediums whereby God signifies his judgment of the tribes. If God was unhappy with his people the stones would turn dull and colorless, but they would shine brightly when he was pleased.

These twelve stones have been linked with the birthstones, the signs of the zodiac and the phases of the moon.

There is much more mention of gems in the Bible, and this has been fully analyzed in several other publications.



(8)

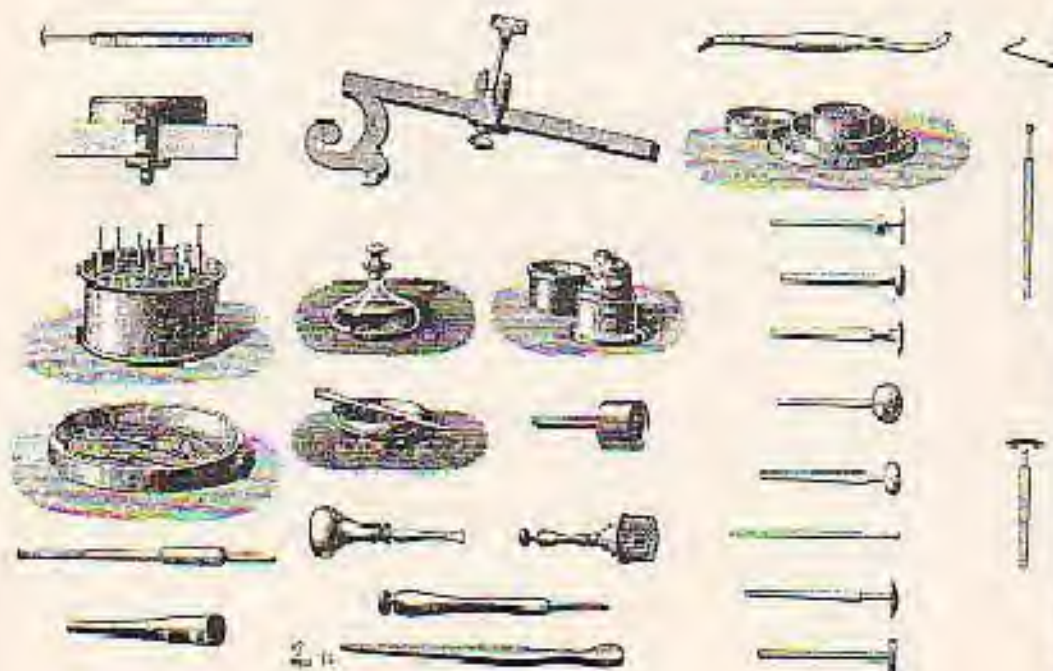


(9)

The history of engraved gems is a subject that is well familiar to every archeologist as their inscriptions dictate the way of life in early times. These engraved stones were worn with such profusion by the Romans that it is now possible to date the ages of Roman influence over different lands by the gems found in various ruins. The engraved cameo and cup show the complex manner in which the gems were engraved. The engraving on the stones often contained many occult symbols which complimented the occult powers of the gem itself.

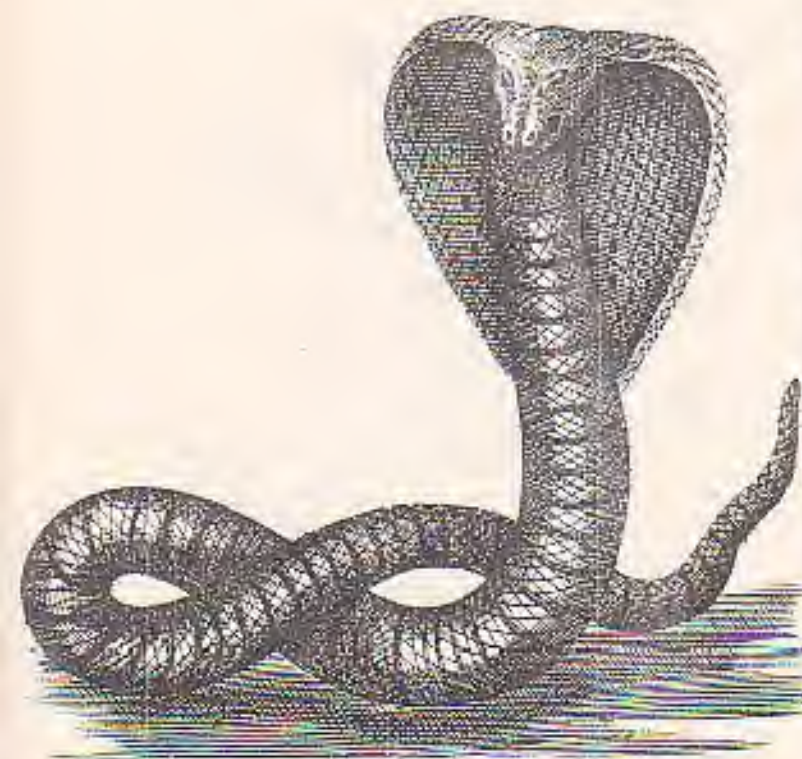
Gems have been engraved by nearly all the ancient civilizations over the world. The problems of engraving have been considerable, and below are some of the tools used in the 14th century and an engraver of that era. As early as the 16th century they covered flat slabs of stone with beeswax then engraved the pattern into the wax and bathed the whole thing in acid which etched that pattern while the wax protected the rest of the stone. There have been many books on engraved gems.

(1)



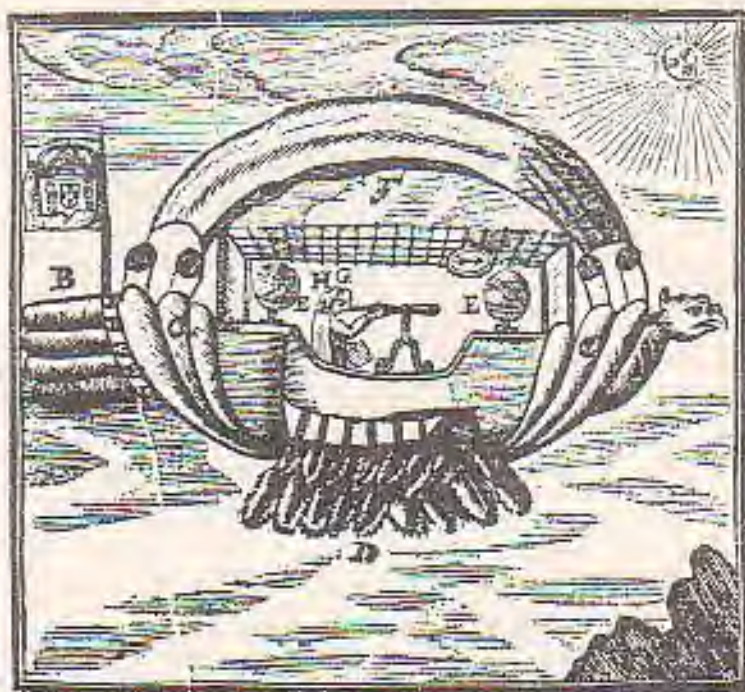
(10)





(11)

The magical lore of amulets, talismans and charms as gems is very nearly endless. It seems quite hard for us to understand how people could possibly believe the idea behind the above plate showing an airship being held aloft by the magnetic powers of the coral-agate in the net. Do diamonds grow and mature? Do emeralds help your eyes or tell if your wife is true? Do rubies darken when their owners are ill? Is the sky a giant sapphire? Does amethyst keep you sober? Will turquoise brake a fall? Is rock crystal frozen water juice of the mountains? Is opal unlucky, or is it as lucky as all the gems whose colors are reflected from it.



(6)

In the past it was believed that many living things supplied gems; and to name a few, there was the toadstone, snakestone (from cobra shown above), pigstone, carpstone, crab eye stone, hyena eye stone, stag's tearstone, eaglestone, cockstone, and the porcupinestone.

There seems to be an endless overlapping between history, occultism, and gems. Nearly every book on gems makes it a point to mention some of these interrelationships and there are quite a number of books which make an effort to cover all aspects of the subject.

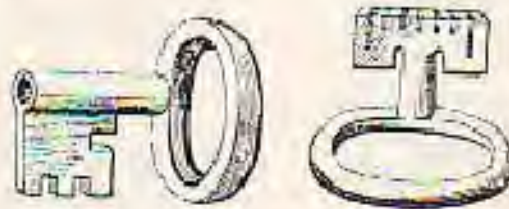


1. spiral ring with head of Læon and Serpens
 2. Etruscan gold ring
 British Museum
 Fairholt's "Rings and an Artist"



Silver ring with ten projections
 (diamond ring) that for the Greek (the
 head) from the design of the Cross
 Ferguson
 British Museum

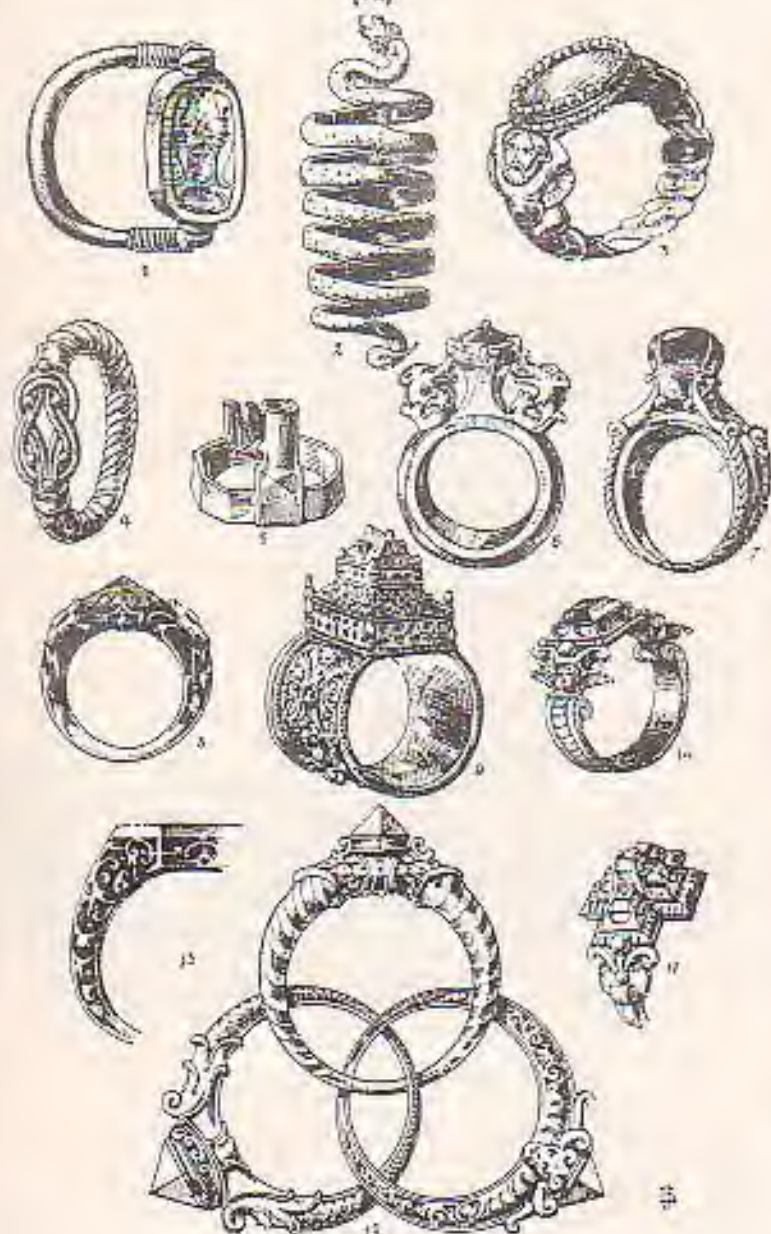
Imperial ring with female head incorrectly said to be that of Ptolemy
 wife of Ptolemy
 Montfaucon, "L'Antiquité expliquée," Paris, 1710



The circle, a never-ending, never-beginning, eternal object — that is the finger-ring. The history of the ring is shrouded in a great span of time — perhaps as much as ten thousand years — and dispersed over the entire world through all the great civilizations. Its original purpose could easily have been a tribe symbol. Later, the ring was used to hold a seal that was the family sign and business signature. Among the Greeks and Romans it was a death offense to copy someone's engraved seal, so that the variety of style became almost limitless. The

most prolific age for rings was that of the Roman empire when many people wore as many as three rings on each finger plus one or two on each toe. Rings have been made to hold many things of curiosity, such as pills, hair, poison, pictures, keys, watches, and engraved amulets or talismanic symbols. It is the opinion of the writer that the ring is a frame as that of a fine painting and is never complete without a gem of some pleasing variety set within it.

(12)



The preceding three plates are very interesting but are only a fraction of the variety of rings shown through history. The study of rings has been well reviewed in several monographs, and the subject, like engraved gems and gem lore, is so extensive it involves an overlapping of the subjects of history, archeology, occultism, and religion.

It has been shown by history that in times of much occultism and religion the wearing and appreciation of rings has flourished. Perhaps that is why the number of rings sold today has lessened, because of our lack of interest in these subjects.

(12)



Jewish wedding rings, one with Temple dome, the other with slant-roofed structure. Each bears the Hebrew words *Mazal Tov*, or "Good Luck." Partlett's "Rings of an Artist."



Jewish wedding ring, with the houses and as Israel's projecting figure. This is linked and covers a gold plate. On the inside of the ring is "Good Luck." British Museum.



Jewish wedding ring. Gold hoop with five facets of flowers encircled with flowers in pale blue, green and white enamel, and a gold-like progression with two small windows. Nineteenth century. British Museum.



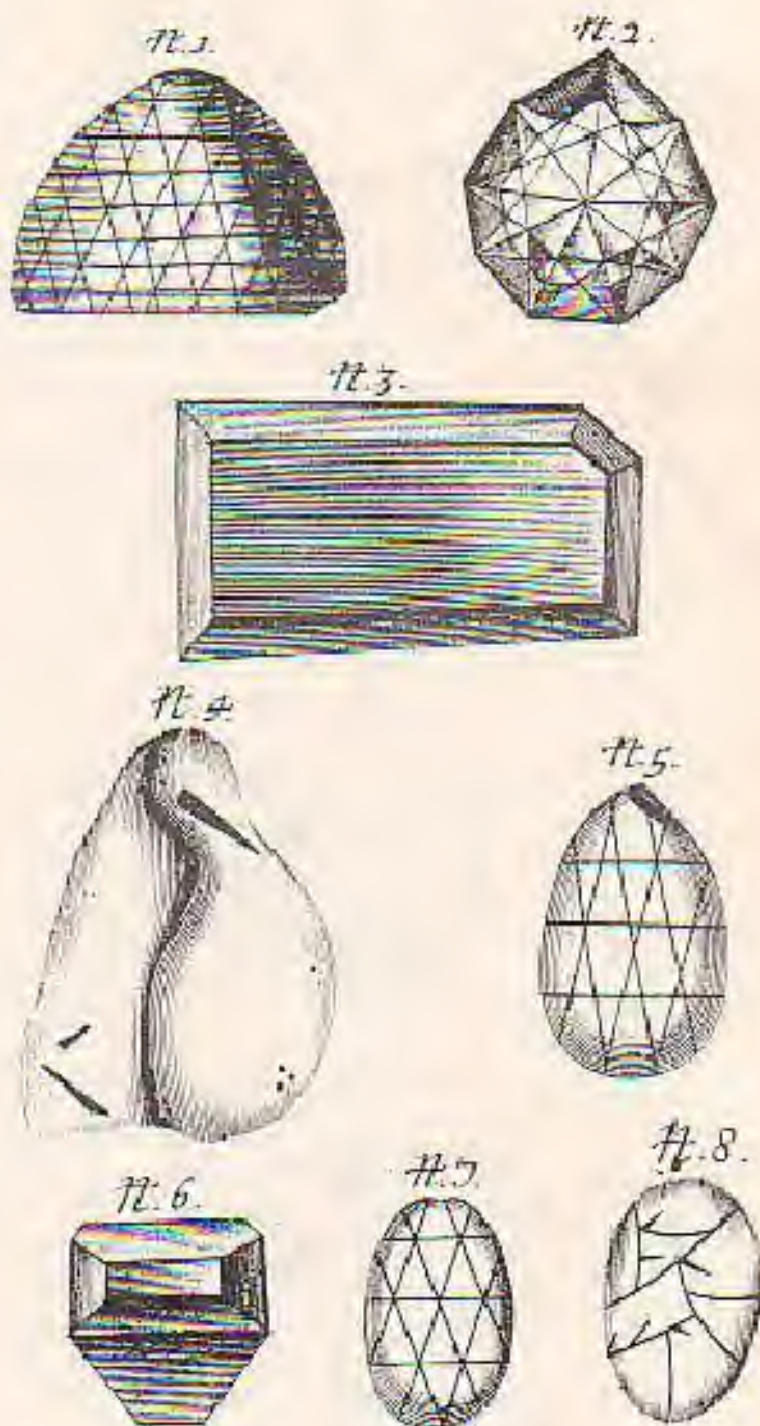
Jewish wedding ring. Broad gold hoop, the sides showing the crown of King, the Fall, and the Expulsion from Eden. German, sixteenth century. British Museum.

(13)



Joan Baptiste Tavernier was born in Paris in 1605 and could well be called the father of the gem trade because of his many travels to the Far East. Tavernier made six major journeys of at least two years and as much as five years each. He brought jewels from Persia and Spain — which included emeralds from Colombia — traded for pearls in Persia, and for diamonds, rubies and sapphires in India. On all his trips he kept a detailed log of his journey which was printed as a book, and this is now very

(11)



commonly quoted in gem books. The plates in this section are taken from the first English edition in our library, of which only two other copies are known to exist. Later editions are more common.

Tavernier kept drawings and descriptions of the more important stones that he saw, and the above are the more important diamonds that he had come across. In the plate above, number one is a drawing of the legendary Great Mogul, said to weigh 280 carats.

THE SIX
VOYAGES

OF
JOHN BAPTISTA TAVERNIER,
BARON of AUBONNE;

THROUGH
Turkey, INTO Persia
AND THE
EAST-INDIES,

For the space of Forty Years.

GIVING
An Account of the present STATE of those
Countries, *Viz.* Of the RELIGION, GOVERNMENT,
CUSTOMS, and COMMERCE of every Country;
and the Figures, Weight, and Value of the MONEY
currant all over ASIA.

TO WHICH IS ADDED,
A new Description of the SERAGLIO.

Made English by J. P.

ADDED LIKEWISE,
A VOYAGE
INTO THE
INDIES, &c.
By an English Traveller, never before Printed:
Publish'd by Dr DANIEL COX.

LONDON:

Printed by WILLIAM GODDID, for ROBERT LITTLEBURY
at the King's Arms in *Little Britain*, and MOSES PITT
at the Angel in *S^t Paul's Church-yard*. 1677.

This is the titleplate of the first edition in English of the classic work by Tavernier.

(II)

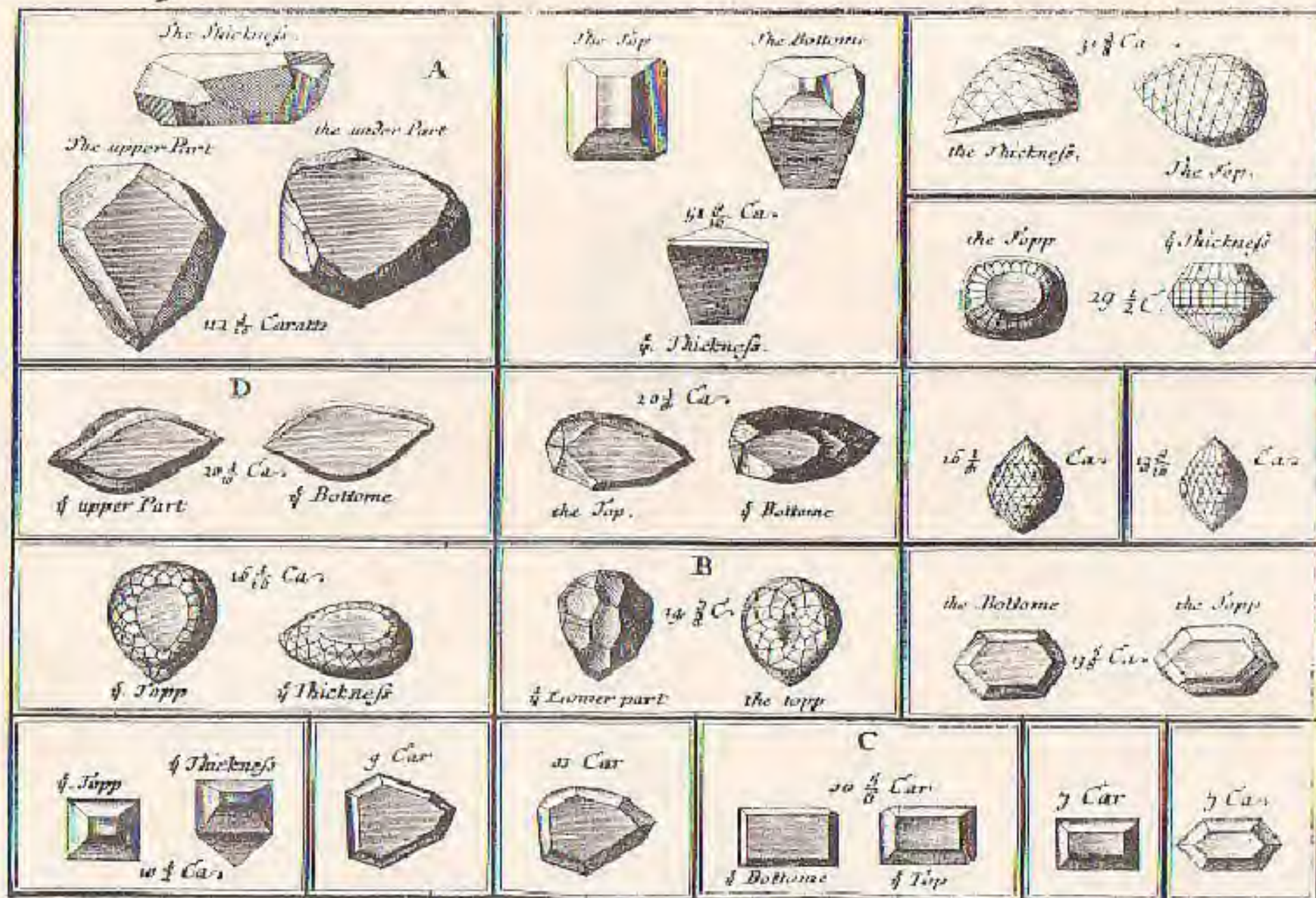
(II)



On the left, above, are shown some of the fantastic rubies (No. 1-5) and a large topaz (No. 6) which Tavernier saw in India, while on the right are shown the pearls which he saw in Persia.

Tavernier's descriptions had been taken on faith because of his well-known honesty, but in 1965, when the Crown Jewels of Iran were put up for public viewing, some of these stones were first seen.

The book gives first-hand accounts of the birthday of the Great Mogul, pursuit by pirates, long overland treks, everyday village life, monetary and trading systems, public executions, methods used for mining gems and areas of mining, plus much more. One gets a total view of the life in Europe and the Far East in the 1600's.



A. Is a Diamond cleane of a faire vid.^{let}
 B.C. Are two of a pale rose Colour
 D. Is one of an Extraordinary faire
 water.

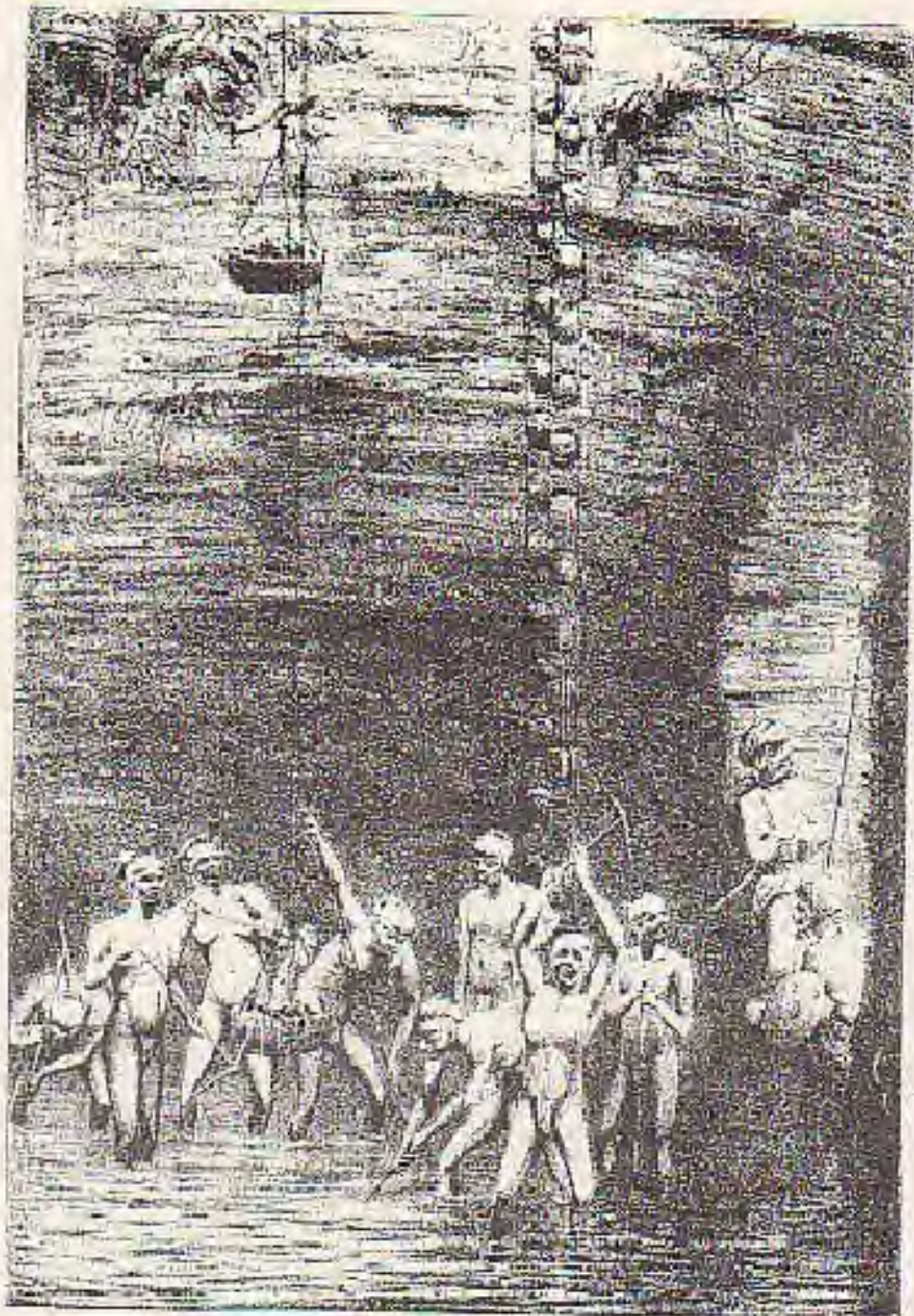


All the rest are white and Cleare
 and were Cutt in India.

The three below marked 1. 2. 3.
 are foule

(11)

This is Tavernier's most famous print which includes twenty diamonds sold by him to the King of France. The French Blue (A) was later recut to make the famous Hope Diamond (45.52 carats) plus the Brunswick Blue (13.75 carats).



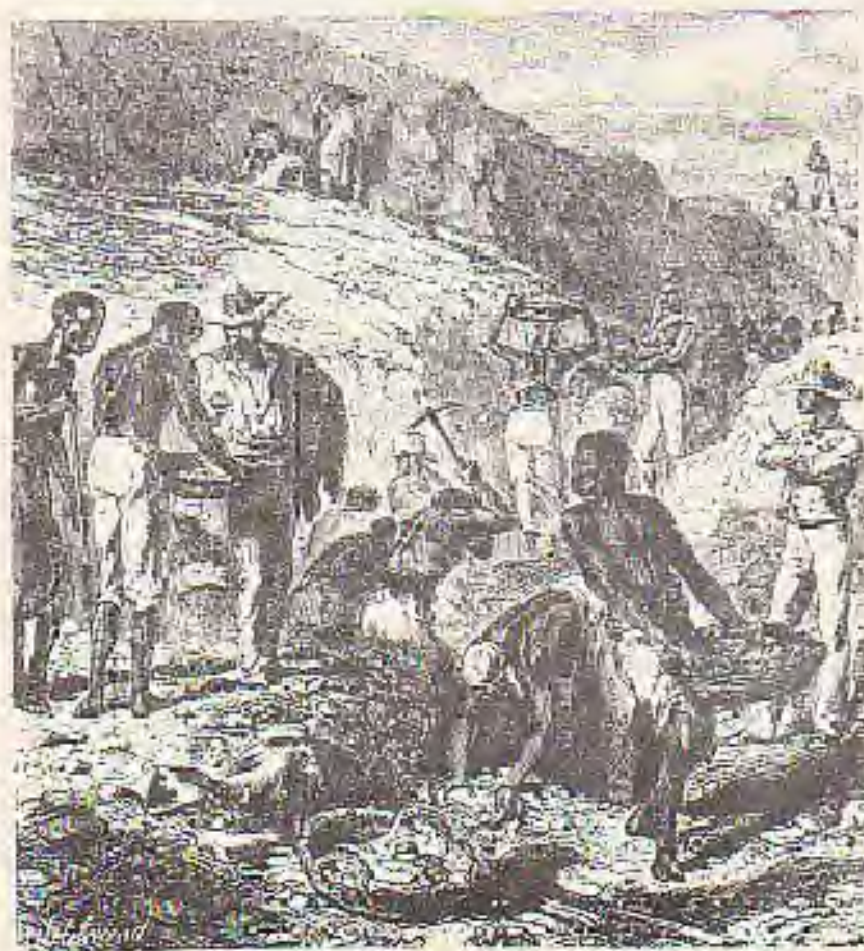
Until 1725, when diamonds were discovered in Brazil, India was the only major producer with Borneo a minor producer. The diamond mines were first fully described by Tavernier around 1630 who said that it was an ancient industry at that time. The above sketch, circa 1867, shows the primitive mining methods of the Panna pipe area, opened about 1760. The alluvial diggings of the Golconda are said to date from about 400

B.C. and are considered the source of the Koh-i-noor and Hope diamonds. The yield of diamonds from India through all its history is equal to a couple of good mining years in South Africa now.

It is interesting to note that India has in the last few years started to reopen some of the old mining areas, notably the Panna district.



(15)



When the first diamonds were found in Brazil, merchants feared they would swamp the market and drive prices down, so they said that the diamonds were inferior. The Portuguese of Brazil then sent diamonds to Goa (an enclave in Southwest India) where they were mixed in with the Indian stones. After a few years, when they had been accepted as well as the Indian diamonds, the Portuguese exposed them as Brazilian and the merchants were forced to recognize them as good quality.

These plates show how primitive mining methods were in the early days and are similar to those used in India.

(16)



(17)

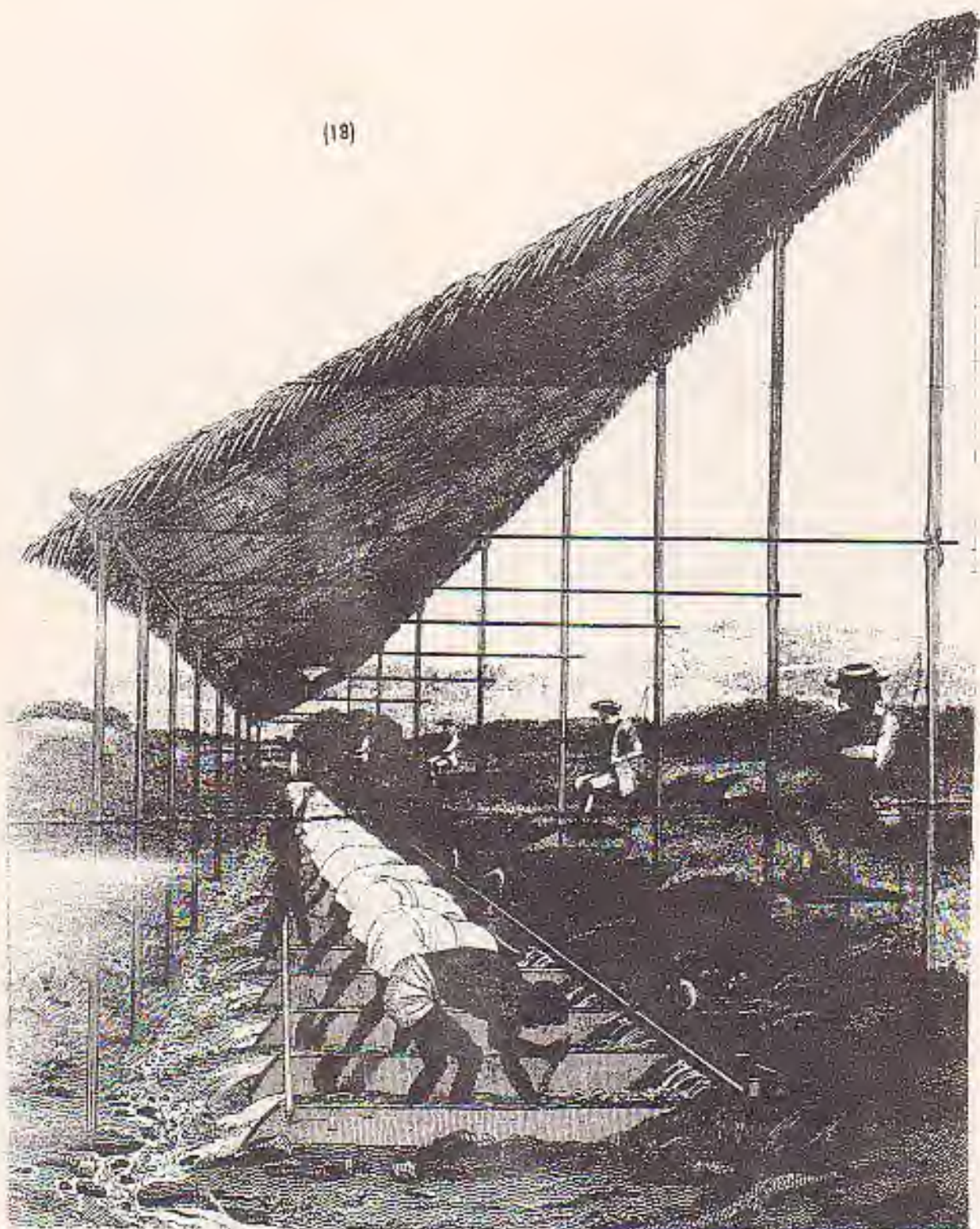


(1)

It is most interesting to consider the effects of a new major gem find on other areas of the world. Not only did the discovery of diamonds start mining in Brazil (as shown in the above plates), but it slowed the production of diamonds in India which was already dwindling. Most interesting is its effect on the cutting industry

which was, in 1720, based in Italy. At that time the Jewish people were being suppressed and were looking for an industry to call their own. They saw the religious tolerance of Portugal and the diamonds of the Portuguese colony in Brazil, and this is when they became involved in the cutting of diamonds.

(18)



The Portuguese had no shortage of labor in their new diamond mining areas because they imported slaves from their land holdings in West Africa. Above is shown how the mining was done on a large organized scale. The white men on the platform overlooking the black workers were there to curb theft, while the grass roof shaded the workers.

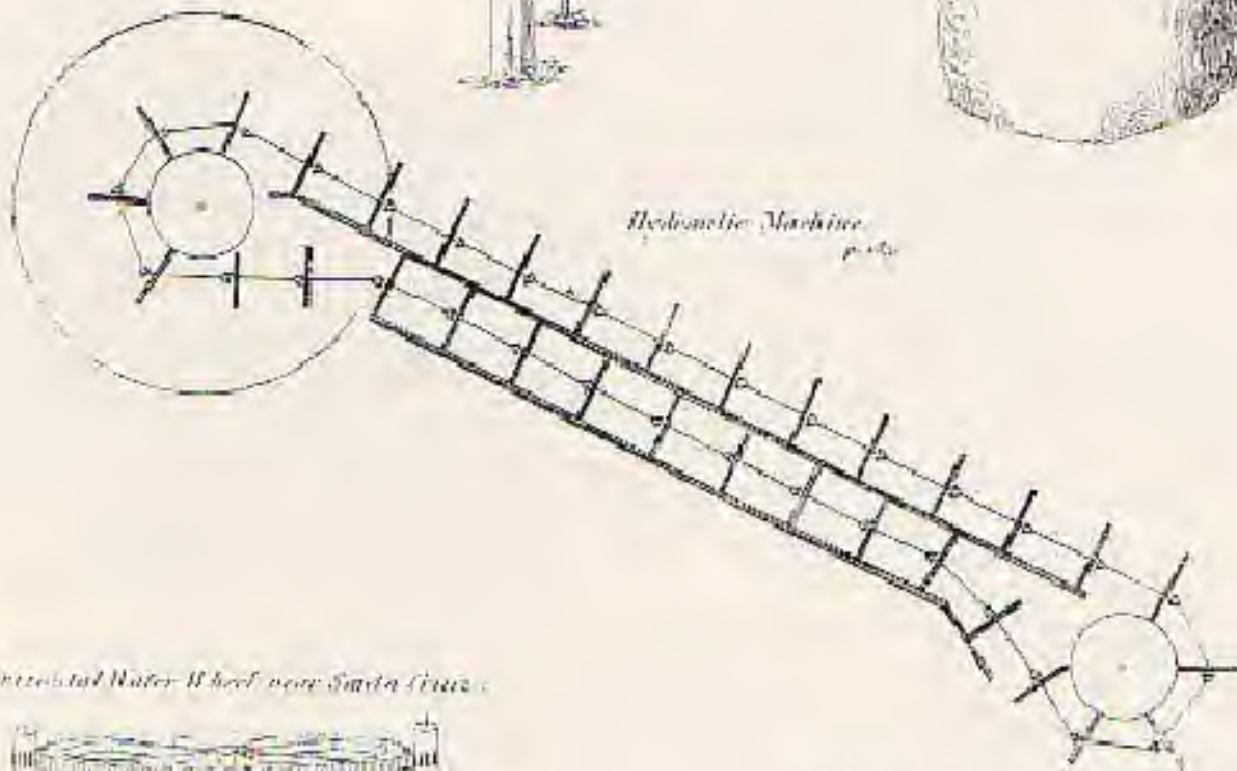
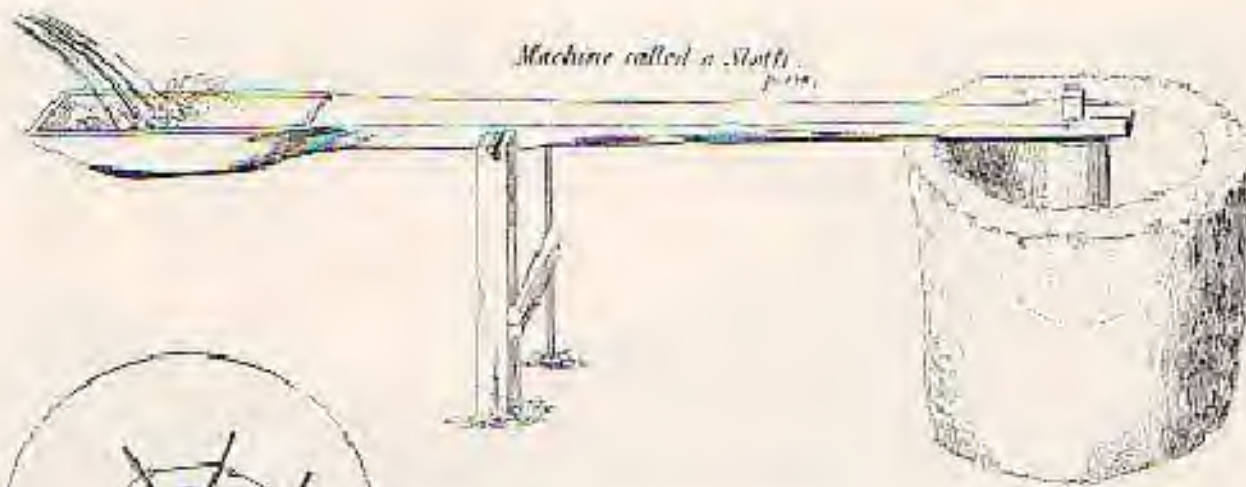


The tremendous seasonal changes in Brazil made it possible to mine in the dry season when the rivers were down and the gravel was exposed. In the dry season water was scarce so that washing the gravel was difficult. The picture here shows how the problem was remedied. The river was diverted for up to several miles, leaving the whole bed of the stream exposed all year round, while in the dry season the water was dammed and stored in the flumes.

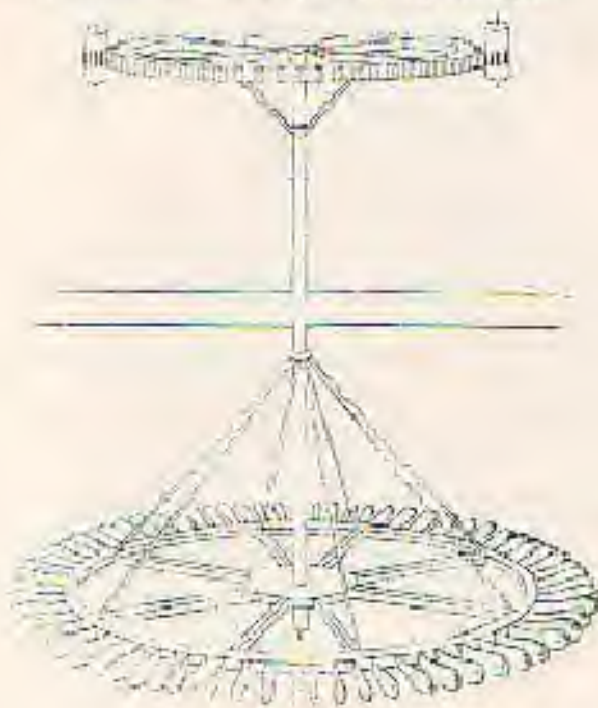
On the next page are shown some other innovative ideas

for mining such as the hydraulic machine [also shown in the picture above] which raises the water so that other devices may be powered.

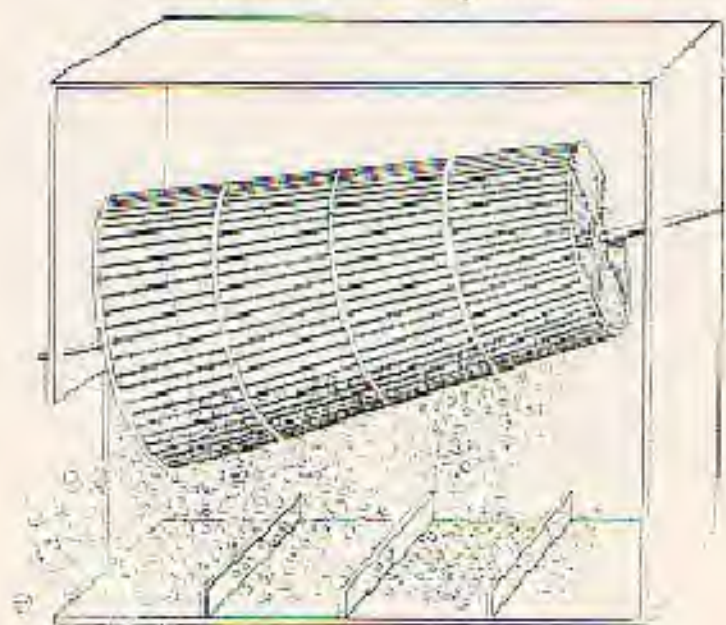
Diamond mining in Brazil had many side-effects on the country, one being the opening of a vast amount of land. The yield of diamonds was so low that many miners soon turned to other things, such as farming, animal collecting, or even mining for something else such as topaz or tourmalines.



Horizontal Water Wheel near Santa Cruz



Cylinder for working the Casahuate



(19)



Kimberley, before diamonds were found.



Kimberley, just after the discovery, 1871.

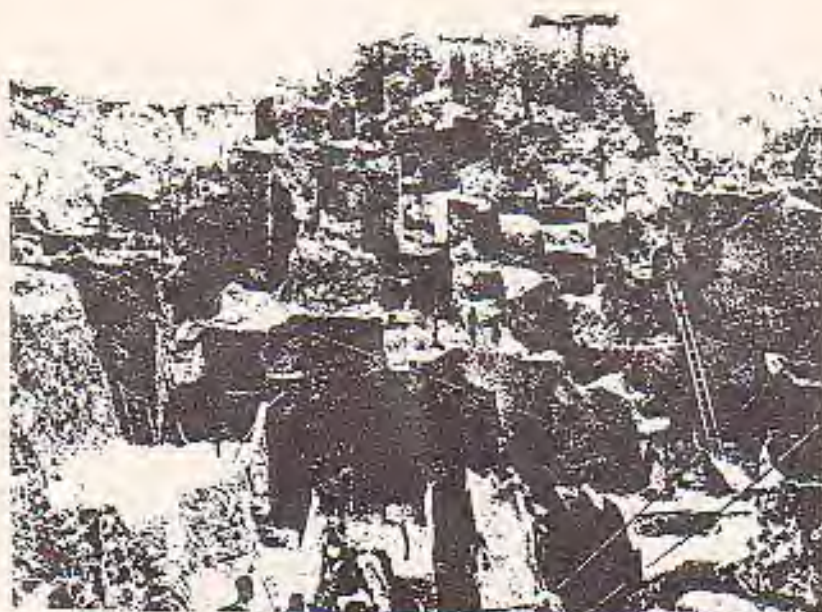
(19)

As Indian diamond production was slowing and failing to meet world demand, the Brazilian diamond deposits were found. Likewise, in 1866, the South African deposits were discovered just about the time when Brazil's production was slowing. Another interesting fact is that with each discovery, the yield increased. Also, world demand had increased to overshadow the output.

The progression of Kimberley, as shown here — transfigured from a near-barren wasteland to a thriving mining community almost overnight. It is surprising, with the crude methods available and the problems with dry climate and vast areas between transportation routes, that progress in mining moved so fast.



Kimberley, 1873.



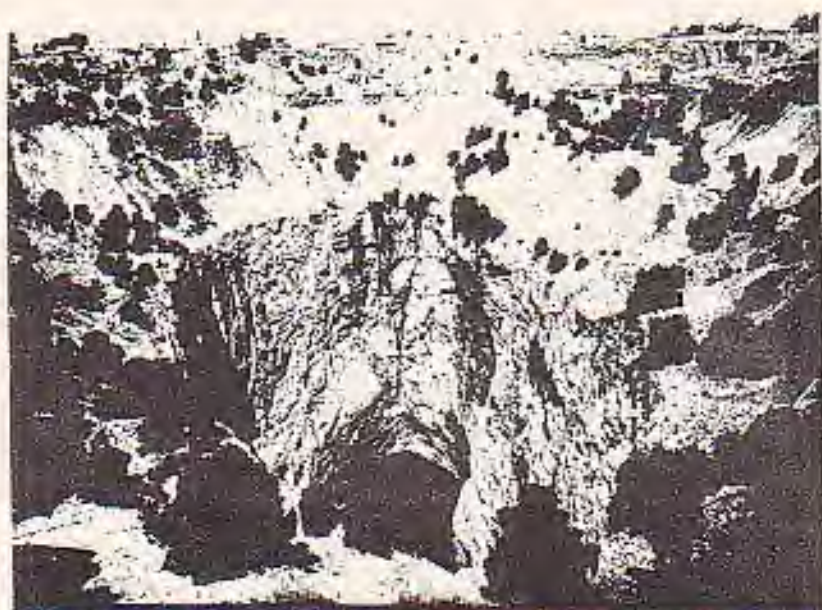
Kimberley, a crumbling ruin, 1873.

(20)

Kimberley, a maze of wires, 1875.



(20)



After the mine walls began to crumble, underground mining was started and old surface workings filled with water, 1935.

(21)

KIMBERLEY MINE

1877

Refer to 1877 New Map published
for more details. See back of map.

A. 1877
B. 1878
C. 1879
D. 1880
E. 1881
F. 1882
G. 1883
H. 1884
I. 1885
J. 1886
K. 1887
L. 1888
M. 1889
N. 1890
O. 1891
P. 1892
Q. 1893
R. 1894
S. 1895
T. 1896
U. 1897
V. 1898
W. 1899
X. 1900
Y. 1901
Z. 1902
AA. 1903
AB. 1904
AC. 1905
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AE. 1907
AF. 1908
AG. 1909
AH. 1910
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AJ. 1912
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AL. 1914
AM. 1915
AN. 1916
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AQ. 1919
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BN. 1942
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BV. 1950
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BX. 1952
BY. 1953
BZ. 1954
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CB. 1956
CC. 1957
CD. 1958
CE. 1959
CF. 1960
CG. 1961
CH. 1962
CI. 1963
CJ. 1964
CK. 1965
CL. 1966
CM. 1967
CN. 1968
CO. 1969
CP. 1970
CQ. 1971
CR. 1972
CS. 1973
CT. 1974
CU. 1975
CV. 1976
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EM. 2019
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EO. 2021
EP. 2022
EQ. 2023
ER. 2024
ES. 2025
ET. 2026
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EV. 2028
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EX. 2030
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EZ. 2032
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FB. 2034
FC. 2035
FD. 2036
FE. 2037
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FG. 2039
FH. 2040
FI. 2041
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FK. 2043
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FM. 2045
FN. 2046
FO. 2047
FP. 2048
FQ. 2049
FR. 2050
FS. 2051
FT. 2052
FU. 2053
FV. 2054
FW. 2055
FX. 2056
FY. 2057
FZ. 2058
GA. 2059
GB. 2060
GC. 2061
GD. 2062
GE. 2063
GF. 2064
GG. 2065
GH. 2066
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GW. 2081
GX. 2082
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HW. 2107
HX. 2108
HY. 2109
HZ. 2110
IA. 2111
IB. 2112
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IH. 2118
II. 2119
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IM. 2123
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KP. 2178
KQ. 2179
KR. 2180
KS. 2181
KT. 2182
KU. 2183
KV. 2184
KW. 2185
KX. 2186
KY. 2187
KZ. 2188
LA. 2189
LB. 2190
LC. 2191
LD. 2192
LE. 2193
LF. 2194
LG. 2195
LH. 2196
LI. 2197
LJ. 2198
LK. 2199
LL. 2200
LM. 2201
LN. 2202
LO. 2203
LP. 2204
LQ. 2205
LR. 2206
LS. 2207
LT. 2208
LU. 2209
LV. 2210
LW. 2211
LX. 2212
LY. 2213
LZ. 2214
MA. 2215
MB. 2216
MC. 2217
MD. 2218
ME. 2219
MF. 2220
MG. 2221
MH. 2222
MI. 2223
MJ. 2224
MK. 2225
ML. 2226
MN. 2227
MO. 2228
MP. 2229
MQ. 2230
MR. 2231
MS. 2232
MT. 2233
MU. 2234
MV. 2235
MW. 2236
MX. 2237
MY. 2238
MZ. 2239
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NC. 2242
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NI. 2248
NJ. 2249
NK. 2250
NL. 2251
NM. 2252
NO. 2253
NP. 2254
NQ. 2255
NR. 2256
NS. 2257
NT. 2258
NU. 2259
NV. 2260
NW. 2261
NX. 2262
NY. 2263
NZ. 2264
OA. 2265
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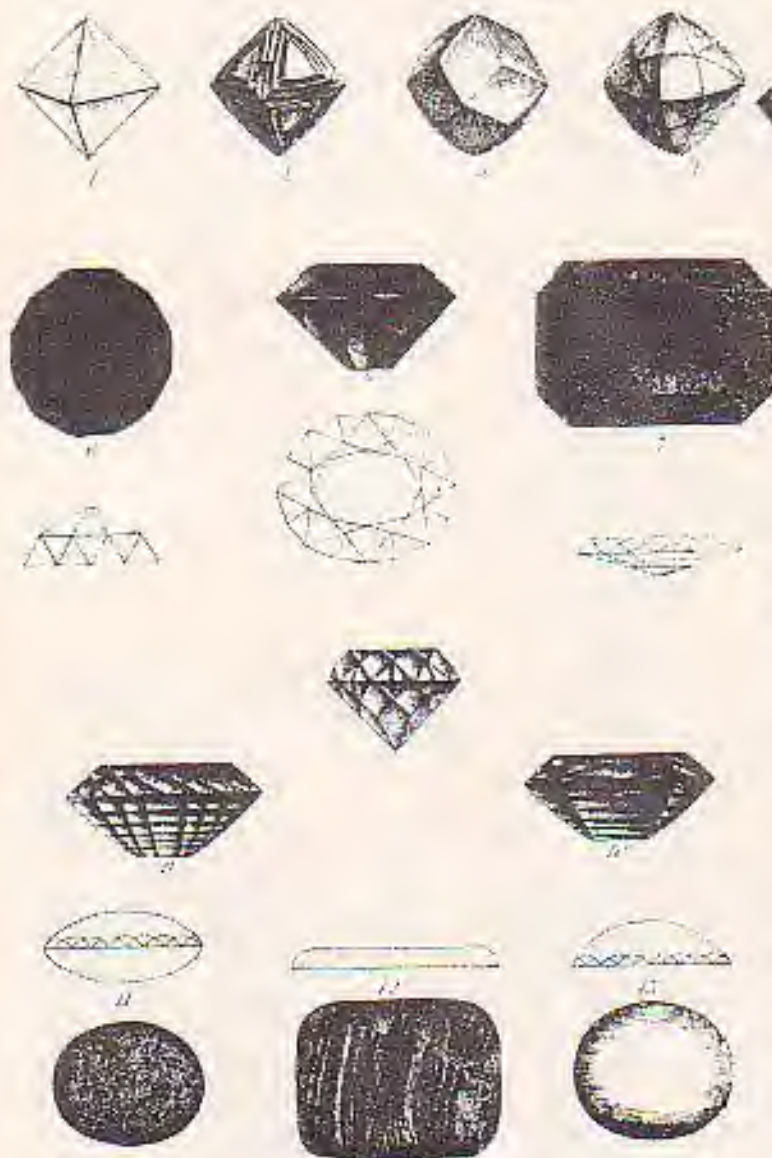
This old claims map gives one an idea of how complicated and how close the quarters were before the conglomerates formed.

(23)



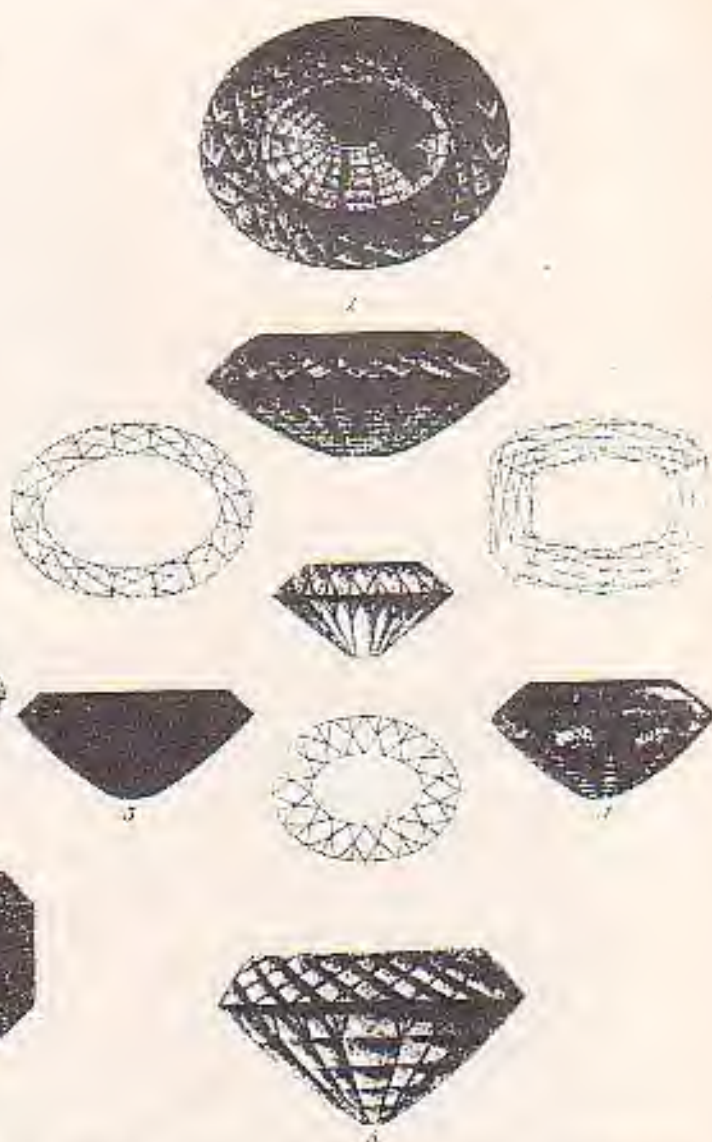
Here an early lapidary explains the complicated job of the diamond cutter.

(22)



In this old lapidary are shown cuts designed to save weight.

(22)



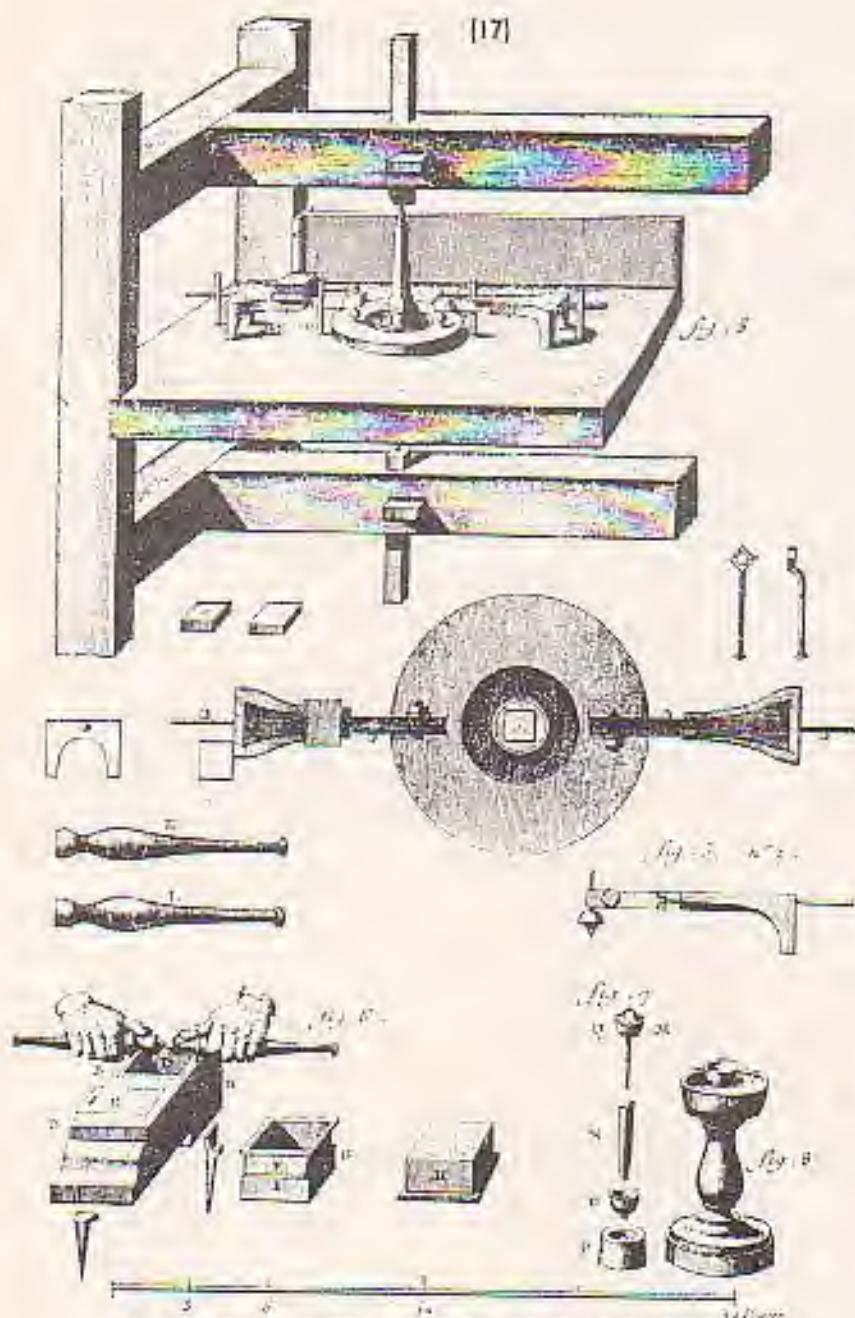
This frontispiece to the first book of lapidary methods in English shows some multi-faceted early cuts.

(23)

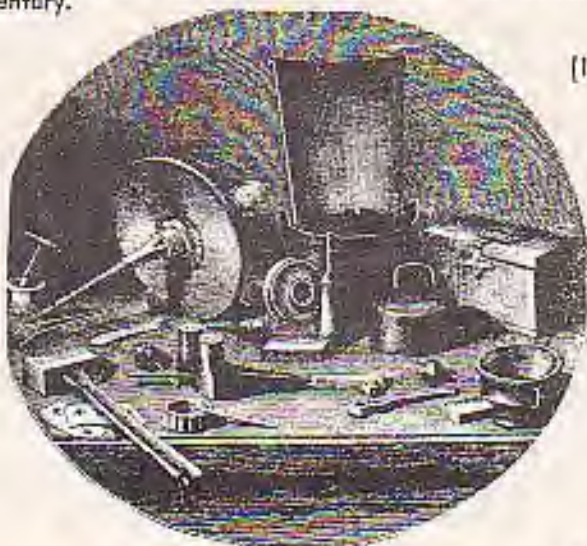


As with the cutter, the polisher must constantly inspect his work.

[17]



The plates above and below show the basic tools of the polisher which have not changed since the sixteenth century.



[1]

[1]



Methods of cleaving are simple but can be very hazardous.

[1]

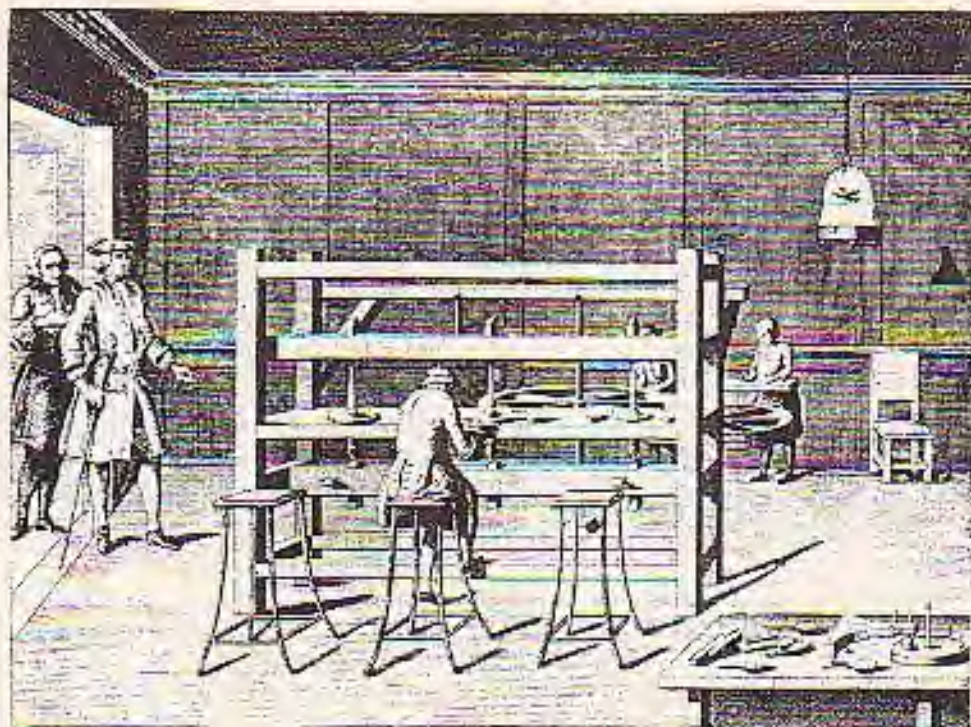


The polisher's job is one of constant care.

[1]



This polishing room shows a central drive power system, often turned by a waterwheel, and employed before electricity.



(24)

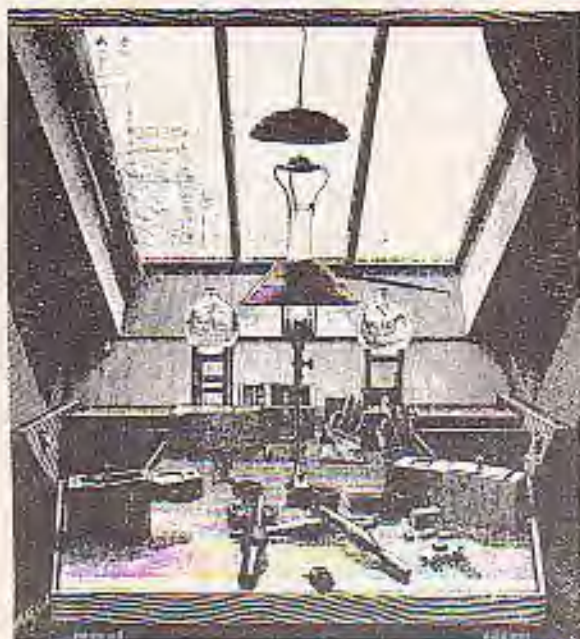
This eighteenth century polishing operation was run on manpower. Otherwise, there has been little change in the tools used today.

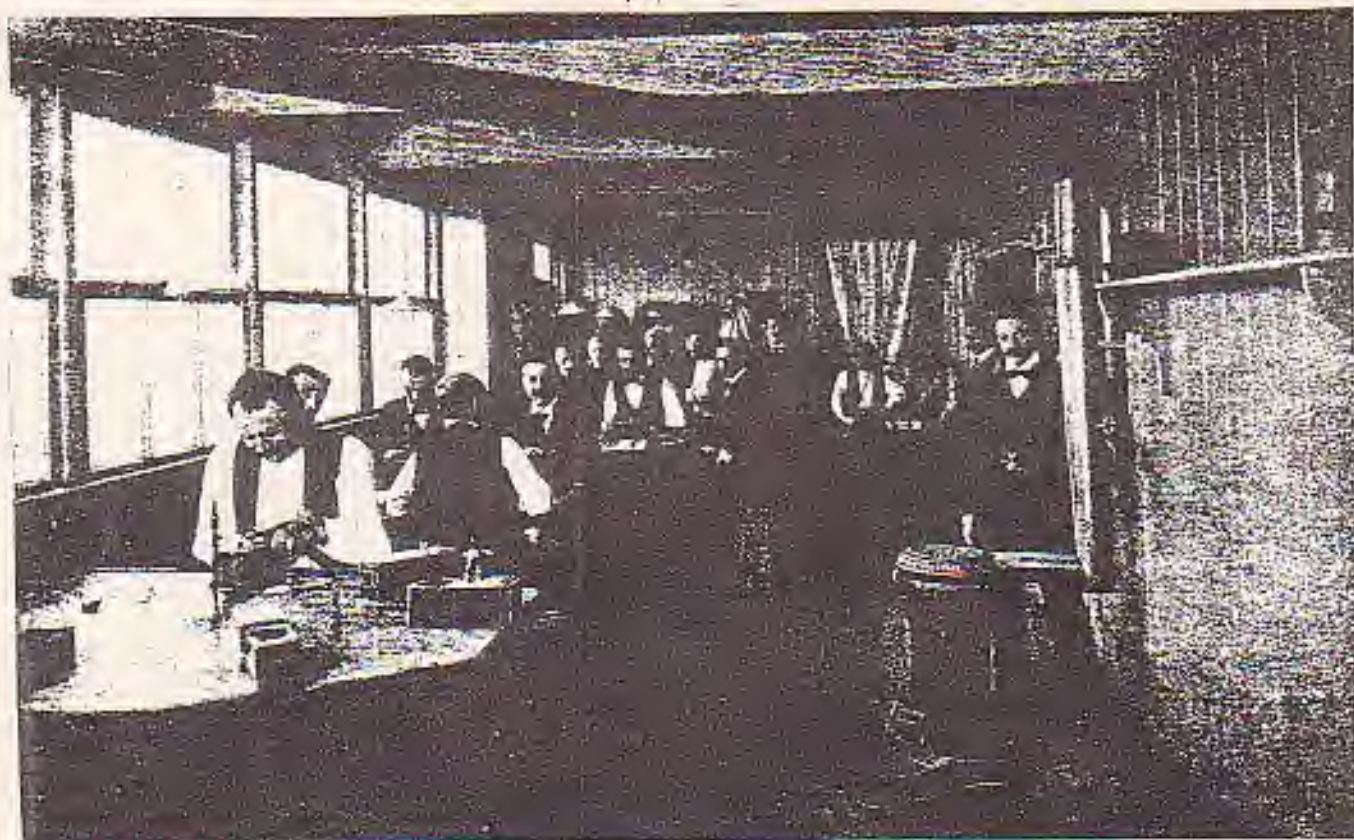
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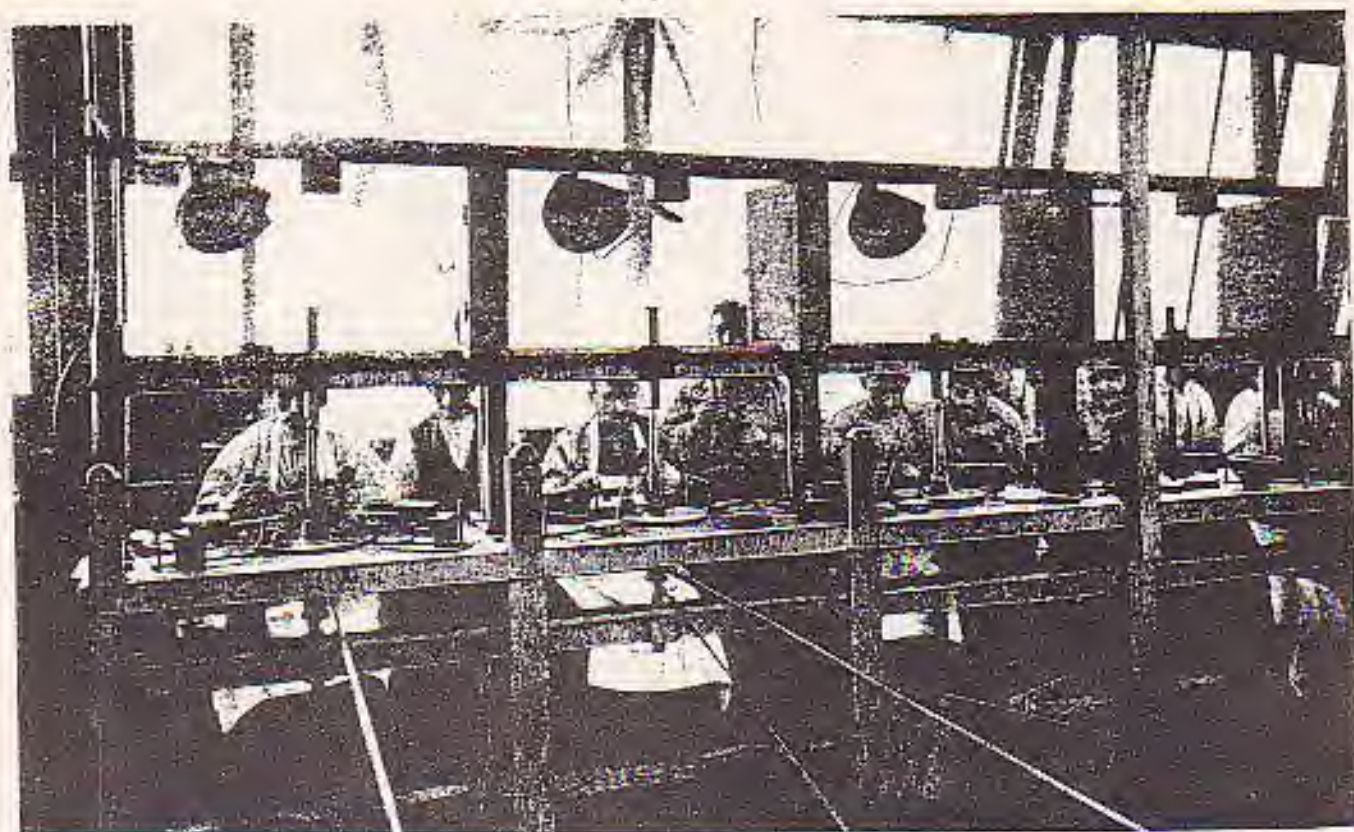
The three plates below show the largest cutting house in the world in 1874 — Coster's of Amsterdam. They were best known for the recutting of the Koh-i-noor diamond in the amazingly short time of 38 days. The wheels were steam powered and the most modern of the time.

Shown below is the splitting room and a close-up of one of the tables.





The cutting room is where the true beauty which the diamond holds is released into a sparkling blaze of fire.



This, as in all polishing rooms, is an area of great concentration as this is where a diamond receives its lustre from the high polishing of its facets. Too much grinding of one facet could mean recutting a valuable stone resulting in loss of weight.



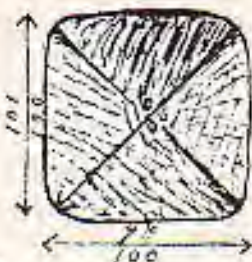
HENRY D. MORSE
Dealer in
Diamonds and Precious Stones.
436 Wash. St. Cor. Summer
Boston.

Henry D. Morse (1826-1888) was the first man to train American workers to cut diamonds. Before that, all diamond cutting had been done in Holland or in America by Dutch immigrants. Morse could be considered the father of the American diamond cutting trade. Prior to setting up his own business he took leave from his home town of Boston to learn cutting in Holland. Later, he cut in Boston with some Dutch people. Two of his co-workers were Simon and Jacob DeYoung, Mr. Sydney DeYoung's grandfather and father respectively. Mr. Morse started his business in Boston in 1861 with several Dutch workers but slowly began to train American born workers. His shop foreman for twelve years, Mr. Charles M. Field, acquired a patent in Boston on April 4, 1876, for the first diamond cutting machine in the world (shown below with Mr. Field). This machine was introduced to Europe very shortly after.



1. Rough Diamond
 Lemon color
 Rough Weight 124 $\frac{1}{2}$ Kts
 Taken from mine, N. York,
 cutting commenced
 Sept. 27 1886.
 Finished Jan. 11th 1889.
 Polished by C. G. Field

Plan view of the
 Stone in the rough.



Top made 35-0 }
 Grown " 880 }

Net weight when
 finished. 77 carats.

Side view of Stone in
 the rough.



Front view of Stone all
 Polished.



Side view of Stone all
 Polished.



Purchased by Tiffany & Co.
 New York

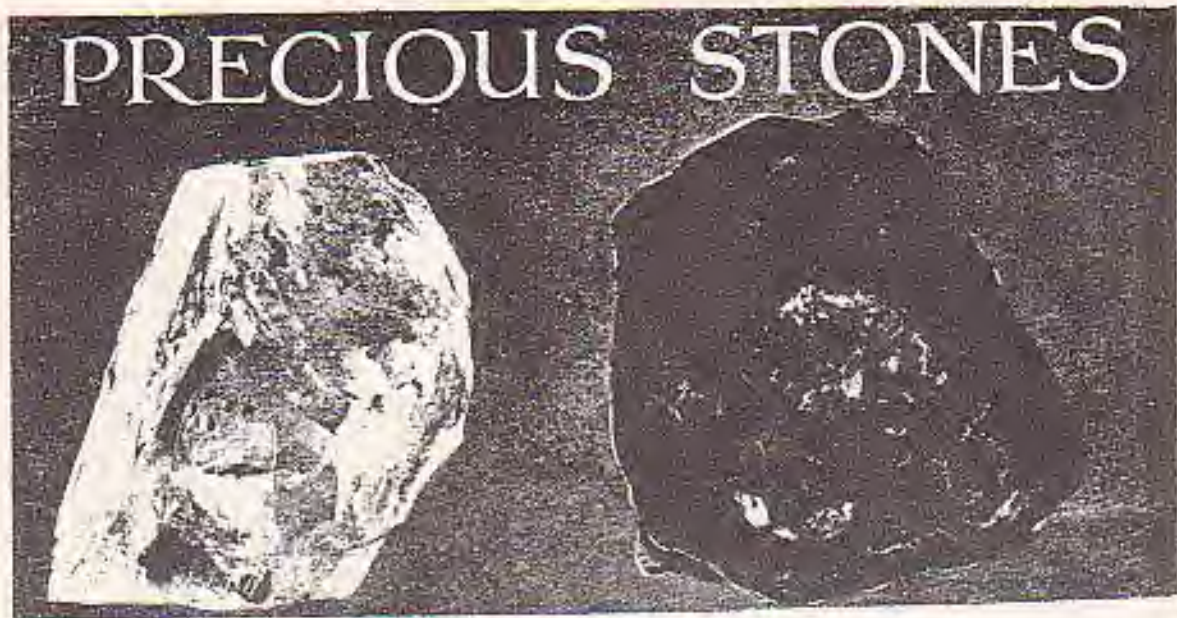
The Henry D. Morse Company was constantly concerned with the development of their firm by the use of new instruments and ideas. Morse and Field worked together to devise a method for cutting diamonds at new angles to produce a more brilliant stone. Some thirty years later, Mr. Marcel Tolkowsky carried on with their work to come up with the American cut or Ideal cut by producing, by formula, the exact proportions necessary. The Morse Company was interested in appropriating a large stone to prove their ability to cut outside of Amsterdam. The DeYongs were instrumental in arranging for the Morse Company to receive a rough diamond of 125 carats. Mr. C. Field of the Morse Company did the cutting, and the stone was very successful in bringing much notoriety to the firm and to the idea of American diamond cutting. Copied above are the sketches and notes of the original workings of Mr. Field which are contained in our library. The diamond was completed at 77 carats and was the largest diamond cut in America up to that time and for several years thereafter.

The Largest Diamond

etc. cut in America has just been finished by Mr. Henry D. Morse of 136 Washington street, this city, for New York parties. It is of the South African species, and when put into Mr. Morse's hands rough its weight was 135 carats. His estimate of loss in cutting brought the jewel down to sixty-two carats, but by skillful handling in the process under his personal care the stone has been made to weigh seventy-seven carats. Though not a white diamond, the artistic cutting of the facets gives it a high degree of luminosity. It is double the weight of the largest finished stone ever cut on this continent, and is but twenty-eight carats smaller than the famous Kohinoor. It has been given a high polish by Mr. C. G. Field, Mr. Morse's foreman, whose patience in the tedious finishing process is highly creditable to him. The perfection which this art has reached in this country is principally due to the study and judgment of Mr. Morse.

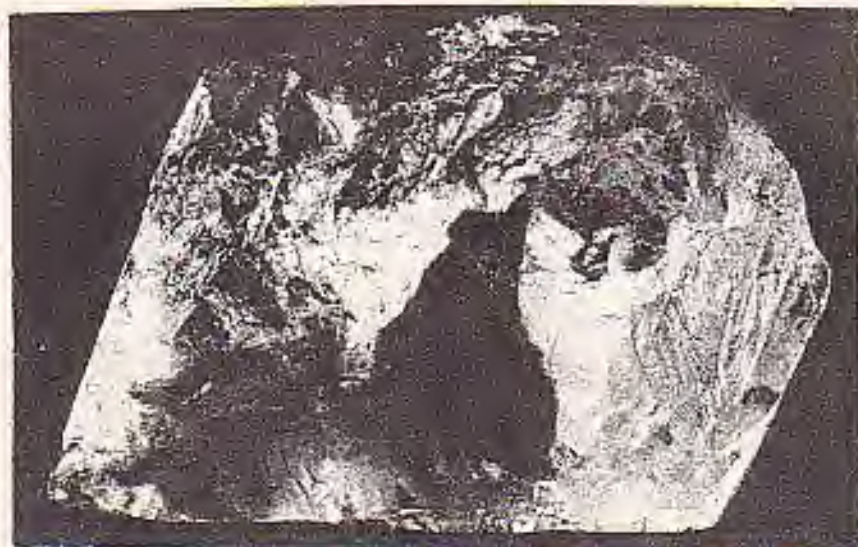
PRECIOUS STONES

(27)



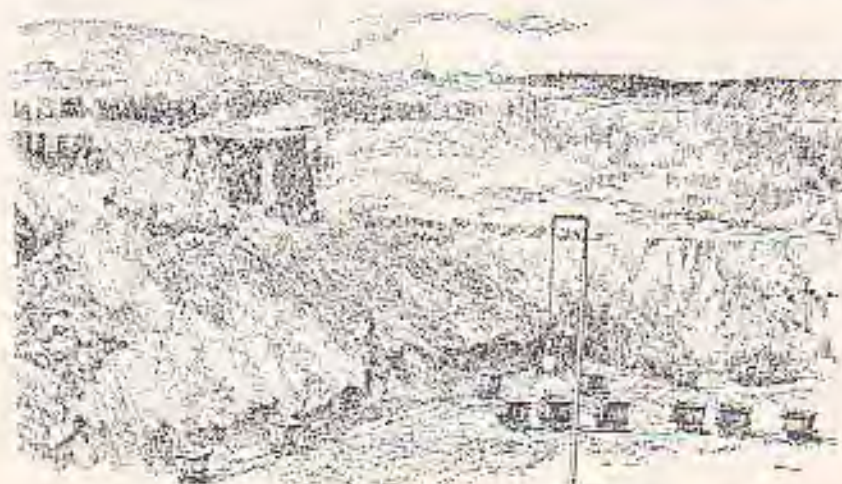
It was not the intention of the author to present plates of unusually famous gems although the library has hundreds. However, an exception must be made for one, the Cullinan, king of kings among gems. It was found in the Premier mine in 1905 and weighed 3,106 carats.

The Cullinan stands by itself, as the second-largest gem diamond is the Excelsior (995.20 carats), found in 1893. The Cullinan is shown above (2/3 size) with the largest carbonado ever found, in Brazil, weighing 3,150 carats.



(28)

The Cullinan is shown here, full size.



(28)

This sketch shows the portion of the Premier mine where the Cullinan was found.



Directly above is pictured that moment on February 10, 1908, when Joseph Asscher of the very famous cutting house, Asscher Bros., in Amsterdam successfully cleaved



the Cullinan, but only after breaking the first cleaving knife. The cleaved stone is shown above in full size.



CULLINAN NO. 1 (530.20 CARATS)
PEAR CUT

CULLINAN NO. 2 (317.40 CARATS)
CUSHION CUT



CULLINAN NO. 3 (94.40 CARATS)
BRILLIANT CUT

CULLINAN NO. 4 (18.80 CARATS)
BRILLIANT CUT

CULLINAN NO. 5 (18.80 CARATS)
BRILLIANT CUT

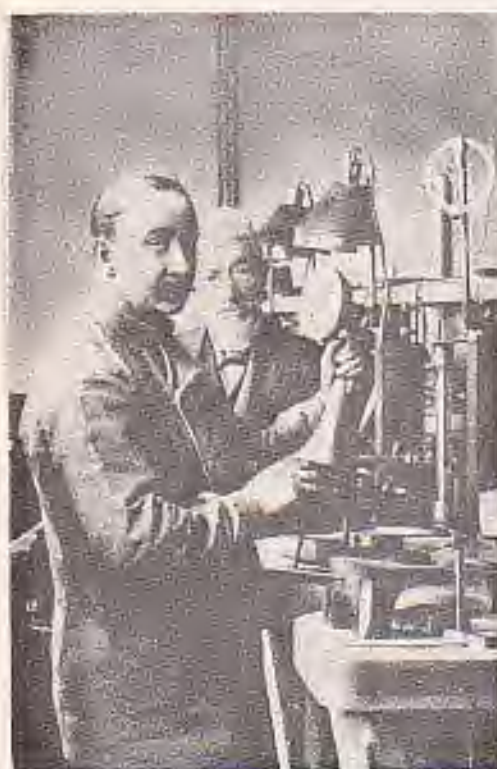


CULLINAN NO. 6 (11.50 CARATS)
BRILLIANT CUT

CULLINAN NO. 7 (8.80 CARATS)
BRILLIANT CUT

CULLINAN NO. 8 (6.40 CARATS)
BRILLIANT CUT

CULLINAN NO. 9 (4.39 CARATS)
BRILLIANT CUT



Henry Koe (above) of Asscher Bros. cut the Cullinan No. 1 weighing 530.20 carats, the largest faceted diamond

Nine of the 140 stones cut from the Cullinan are shown here full size. Cullinan No. 1 (530.20 carats) pear cut; No. 2 (317.40 carats) world's second-largest cut diamond, cushion cut; plus others shown.



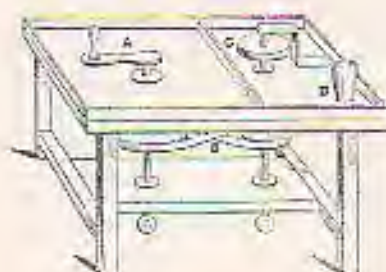
George F. Kunz

Dr. George Frederick Kunz, born in New York in 1856, was the number one gem expert of his time, and his record of accomplishments still gives him that position. At the age of 14 he was trading internationally in gems. Later he sold several collections to private collectors like James P. Morgan (this later donated to the Museum of Natural History in New York City) and public galleries such as the Field Museum of Chicago. At the age of 23 Kunz was hired by Tiffany and Company as minerologist and gem expert and was made vice president soon after. He traveled all over the world for

Tiffany's to investigate deposits and to collect gems. His honorary degrees included M.A. (Columbia University), Ph.D. and Sc.D. The greatest contribution provided by Dr. Kunz were his prolific writings, the quantity and quality of which make him the most important writer, ever, on the subject of gems. He is without a doubt the "father of modern gemology." [A list of Kunz's writings are contained in the bibliography at the end of this book. All of his books, several signed, and approximately 200 papers, are contained within our library.]



(1)



(7)

The cutting of colored stones is very much different than that of diamond cutting. Above left is shown a lapidary table similar to those used since the 14th century. The stone is usually trimmed with a steel blade bonded with diamond or emery dust. The lapidary worker holds the stone in his hand when trimming. On the right, above is shown the same table except that a grinding lap has replaced the steel disk blade; and it works as follows: Turning the handle (A) puts into motion the drive shaft and belt (B), causing the grinding wheel to turn (C). The stone is set into one end of a wooden stick called a dop and set on the grinder while the other end of the dop is placed into one of the holes in (D) at the proper angle for the facet being worked. This is called the jam peg method. Disks of lead, tin, zinc, copper and hard wood with abrasives of alumina or tripoli, for the most part, are used in polishing, while diamond, emery or garnet dust is used in grinding. The author is familiar with a man in New York City who is one of the most respected cutters in the fine colored stone business and he still uses this method described above exclusively.

The adjustable mechanical dop and electrical power, used today by the industry in general, are the only major improvement over the old methods.

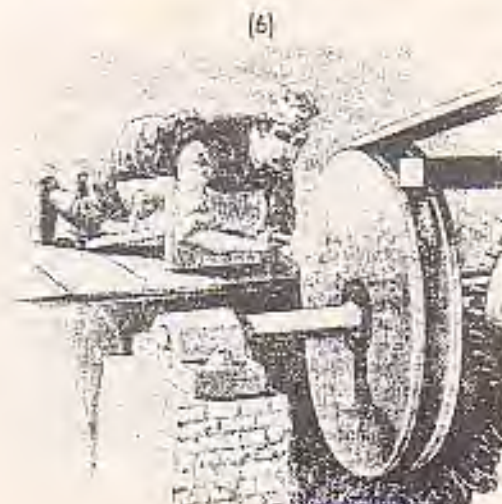


(11)

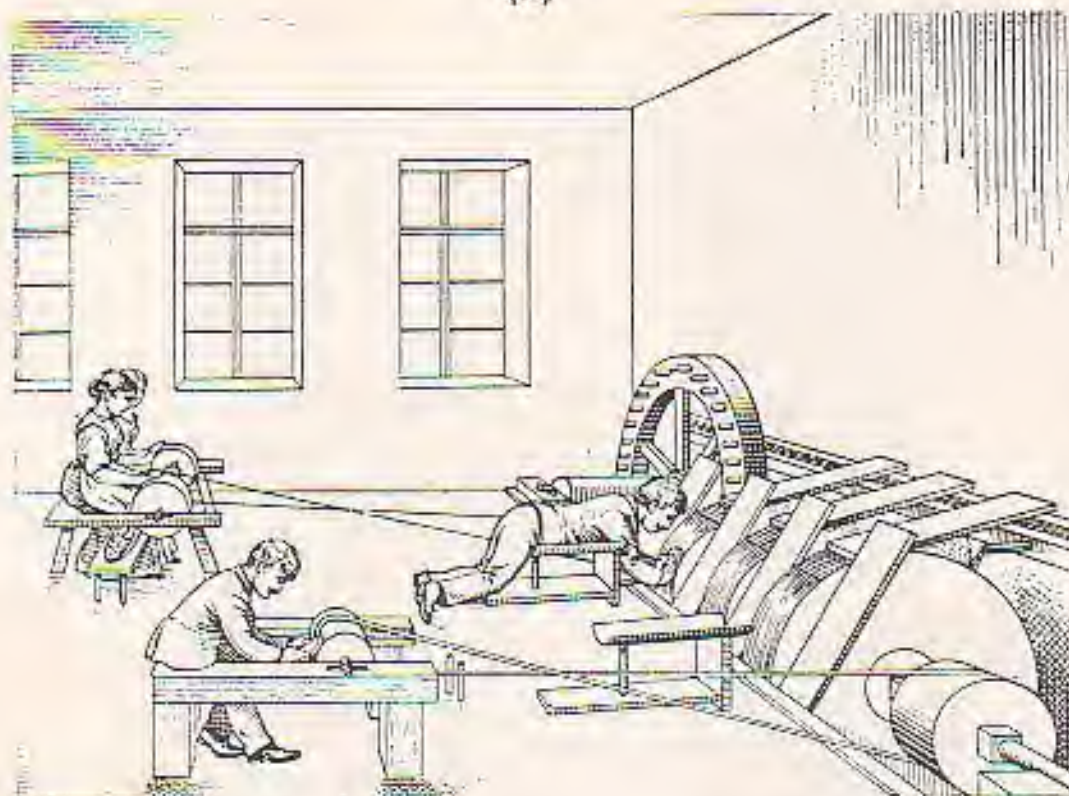
To the left is an engraver of gems, including diamonds, emeralds, cameos, etc. Refer to Page 7 for a view of his tools and works of art. The working of crystal balls has been done since the time of the Egyptians who used them as magnifying glasses and to start fires. Below, left, a Japanese ball lapidary; below, right, crystal ball grinding as done in Germany and France.



(6)



(6)

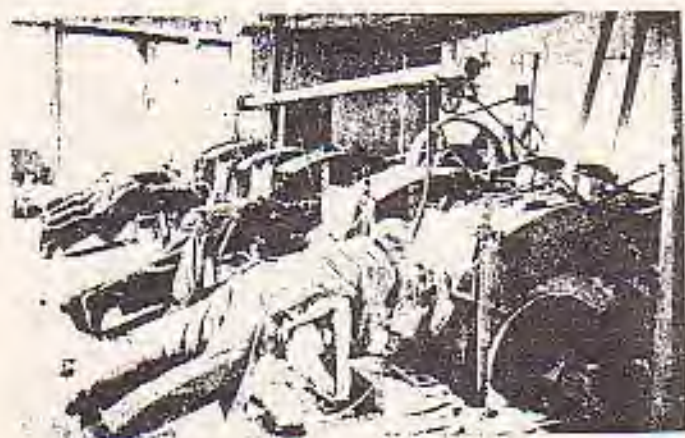


(30)



Idar-Oberstein on the Nehe River in Germany was settled in the 14th century by Roman lapidarists wishing to escape the problems of Rome and also to develop the local deposits. The rivers were used as a source of power to turn the huge vertical grinding wheels. (Electrical power was not used till the 1940's) The area remained the outstanding cutting center for ornamental stones in the world from the 15th century to just a few years ago, although it still is a large producer. (When the local agate deposits ran out they started to use the Brazilian deposits found around 1830.

(30)



The plate above is very old, but to the left is one from 1940, showing little change in methods. The worker lays face down with feet against a support in order to push the stone hard against the wheel.

The outside of a lapidary shop with its water wheel is pictured in the middle.



(48)



(47)

Above is shown the most famous mine for emeralds, Muzo, as it looked in 1914. The sides of the mountain were cut down in steps so as not to miss a foot of potential emerald producing rock. The most famous emerald in the world, "The Devonshire," 1,383.95 carats, from Muzo, pictured above, is now in the British Museum. El Chivor is shown below; and from the pictures (1928), it is easy to see the similarity in mining methods used. Both these mines have been worked sporadically as the Colombian government feels that world supply is low enough.



(49)

The most fabulous emeralds in the world were not known until Pizarro conquered Peru. Pizarro sent back to Spain trunks of emeralds but could not find the source. On March 3, 1537, a youngster in Colombia gave the location of the mines as being at Somondoco. These mines were called El Chivor and were worked by the Spanish for about 100 years. After conditions became unbearable in the jungle and the more prosperous Muzo mines were discovered 150 miles to the northwest, the El Chivor mines were abandoned and lost for 200 years. In 1896 Don Restrepo, with the help of one small shred of evidence, rediscovered the El Chivor mining site.

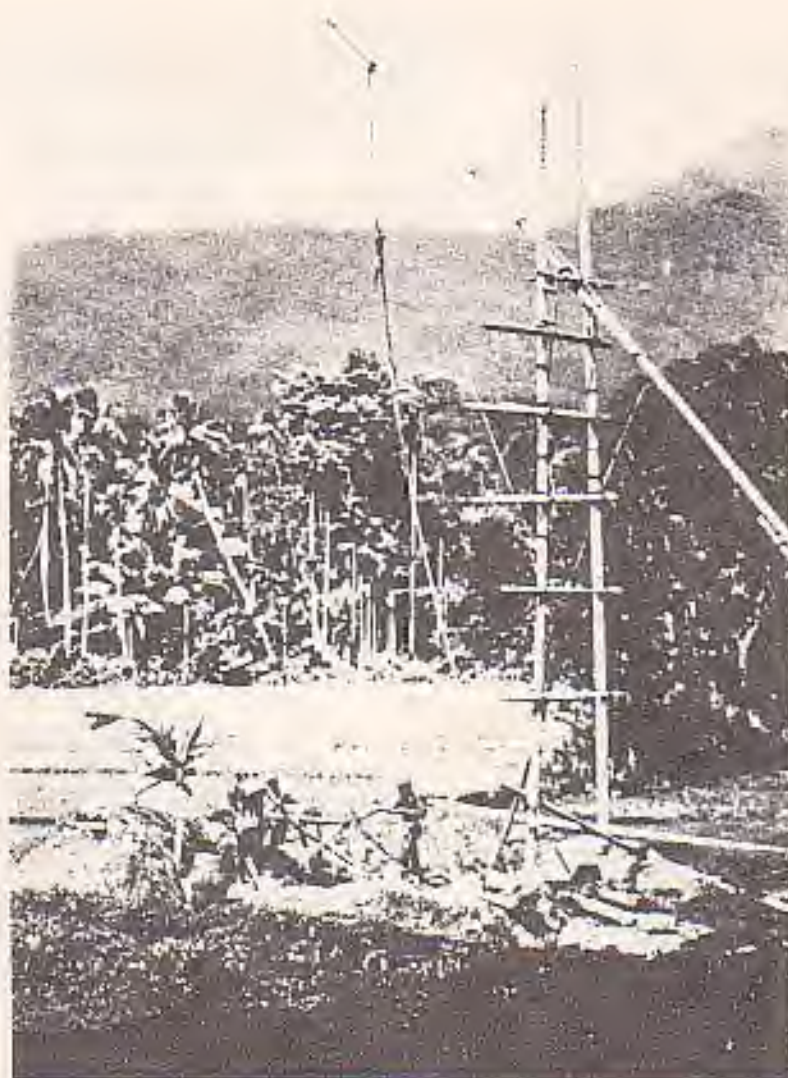


(49)



(49)

(31)



In many places mining methods have not changed any faster than the methods of lapidary. Ruby and sapphire mining in Ceylon and Burma has been going on since at least 300 B.C. and has not changed. Above is shown

a typical shaft being sunk in Ceylon near Palamadulla. Below is a view of the well-known Mogok Valley in Upper Burma, home of the pigeon blood ruby, the sapphire, and several single-locality rare gemstones.



(32)

(32)



(32)

(50)



In Upper Burma in the Mogok Valley, covering nearly 300 square miles, is the indisputable primary source of the finest rubies and some of the finer sapphires in all the world. Tavernier visited these mines and reported on their condition in the mid-1600's. Rubies were first worked from the river alluvium as they are today. Later, in an effort to find their source, miners started to clean out the soft soil and gravel of the many caves in the limestone country rock. These caves, called loodwins, produced the largest stones as they had not yet been exposed to the elements of the weather. Hundreds of these caves were cleaned until in 1889 only five caves were being actively worked. A drawing (1887) is shown at the left of one of the last loodwins worked. Later they worked on a single shaft mining method involving from two to twenty men depending on the size of the village labor force available per

digging. Above is shown the two most used methods of mining in the area, the single shaft method and the river workings, the latter worked mainly by the women of the village. Mining in Burma as well as as Ceylon has always been a community resource harvested by many small groups of men and never a large company with modern equipment. The major exception to this non-incorporated mining was the Burma ruby mining company, set up by Streeter Co. of London shortly after the annexation of Upper Burma to the British in 1886. The company worked on a rental system from the British government. Over the years they built a road through the jungle with great difficulty, and mechanized their mining. For several years the company worked with much success, at one time even relocating the town of Mogok to mine the rich gravel thereunder.

(31)



To the left is shown the open-cast mining used by the company during its most productive era. With the panic caused by synthetics, the depression in the U.S.A., and World War I, the company liquidated in 1931.

The finest of sapphires are those found in 1881, in the Zaskar District of Kashmir, India. The sapphires are of magnificent color possessing a fine milky lustre, often of a cornflower blue color. These sapphires are near impossible to find because the mines are nearly inaccessible and only sporadically worked by the government.



Prima Persepolitana Retibus piscandi modus



Secunda Indiarum per Polum piscandi modus



Tertia Demissio Retis per Polum piscandi modus



Quarta Japoniarum et Siamensium piscandi modus

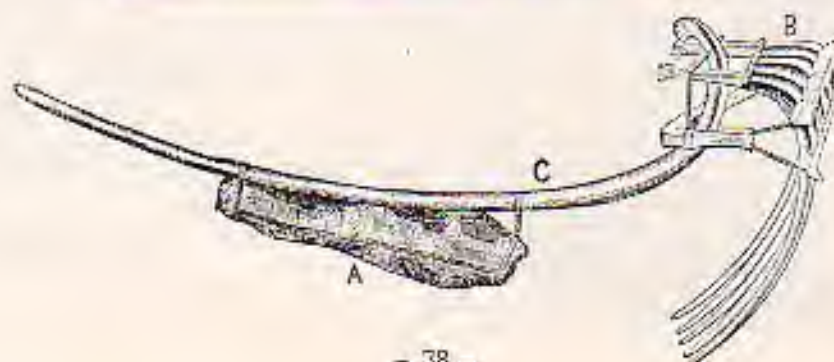
[33]

The pearl is indisputably the queen of gems. Above, in a very old print, is shown four ways of harvesting pearls; 1) by using long nets, 2) using pole nets, 3) diving, and 4) wading in the rivers for fresh water pearls. For count-

less centuries pearl boats have been fishing the Persian Gulf, Red Sea, and the waters between India and Ceylon (shown here). The rake shown below is pulled behind the boat to gather the oysters.



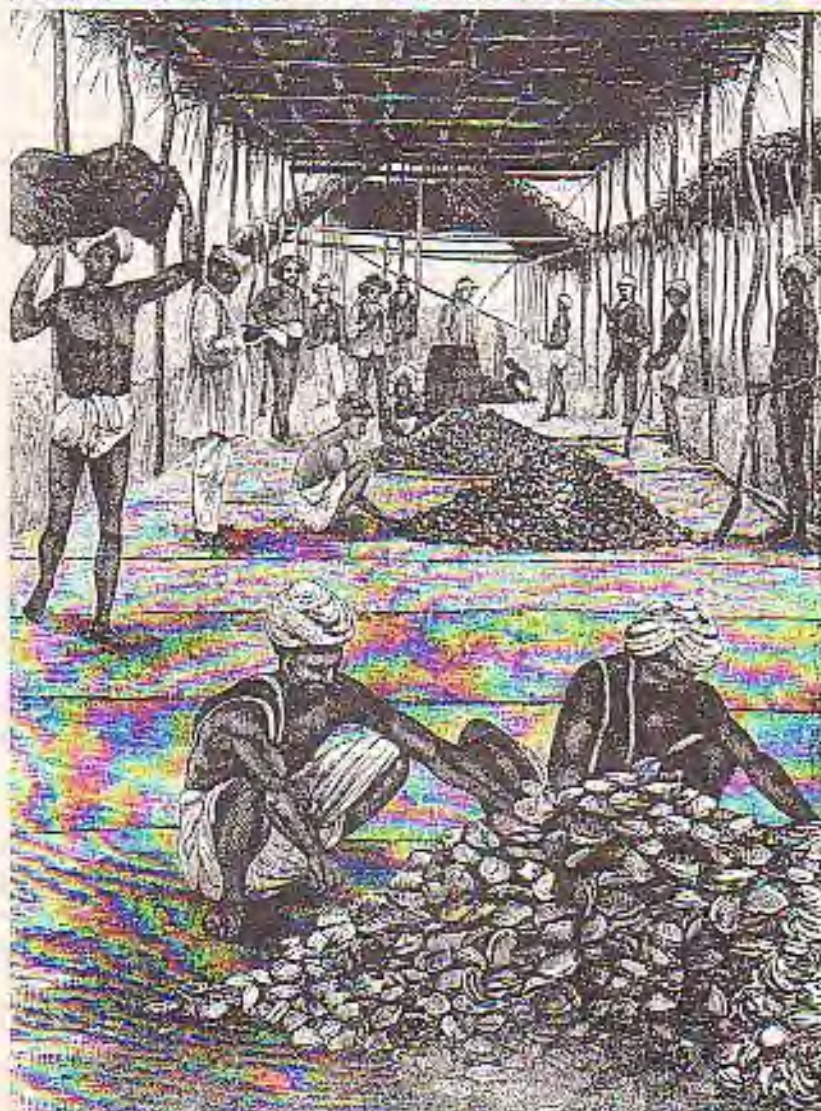
[34]



[35]



[35]



Larger pearl companies open the oysters on board as shown above, whereas the smaller groups leave the oysters intact and have them auctioned off at the port. It is little realized that the value of the shells often adds more profit to the catch than the few pearls found.

(35)

[36]



Fresh water pearls were most likely the first type of pearl used by the ancients as gems. In several archeological excavations dating from 5 to 6 thousand years old in China and 3 thousand years old in northern Europe and along the Mississippi and Ohio Rivers in the United States, there have been found large quantities of fresh water pearls. Fresh water pearls have been fished from Siberia, Europe, Africa, China, and both North and South America. To the left is shown a Scotsman scoping for pearl oysters and netting them; while below are some tools used to get the pearl without harming the oyster. Most of these fisheries have ceased because of over-fishing and pollution. In the early part of this century there were some very large pearl rushes in the United States, all now ceased.

[37]



[37]



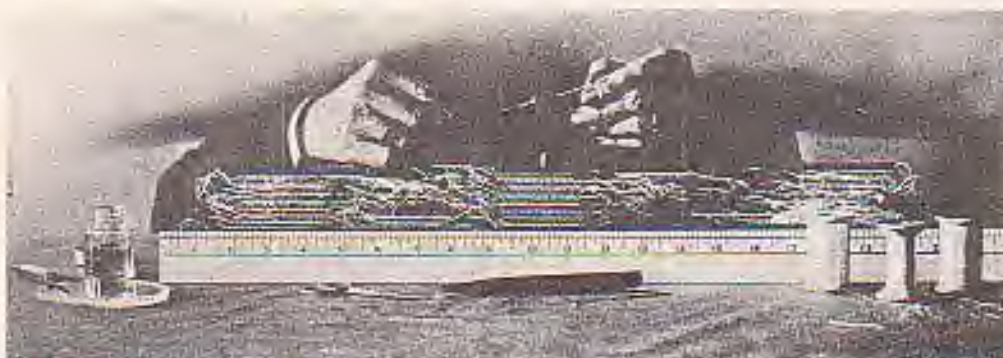
[33]



The Hope Pearl, the queen of gems shown here actual size, is the most famous and notable of all pearls. As described in Mr. Henry Hope's collection catalog of 1839 (also containing the Hope Diamond), this pear shaped oriental pearl weighs 1800 grains and is white at the small end and greenish at the larger end. Records show that after Mr. Hope died, Christies of London sold the pearl, along with the rest of the collection, in 1886. Later it was resold by Messrs. Garrard & Company of London in 1910 for 8,750 pounds. At the smaller end it is capped with an arched crown of red enameled gold set with rubies, diamonds and emeralds.



Scrapping ends of silk threads for stringing pearl residues



Stringing a pearl collar in sections; cleaning and reaming out a pearl



Sliding a pearl along the string in pearl stringing

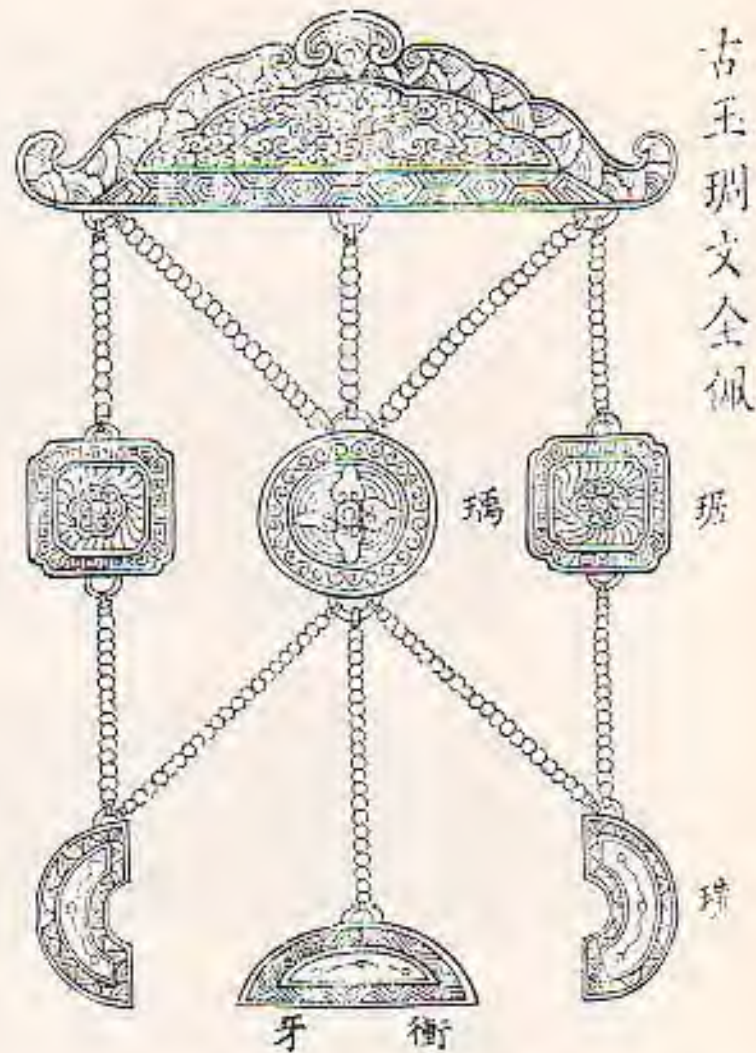


Tying a knot between pearls in pearl stringing

(10)

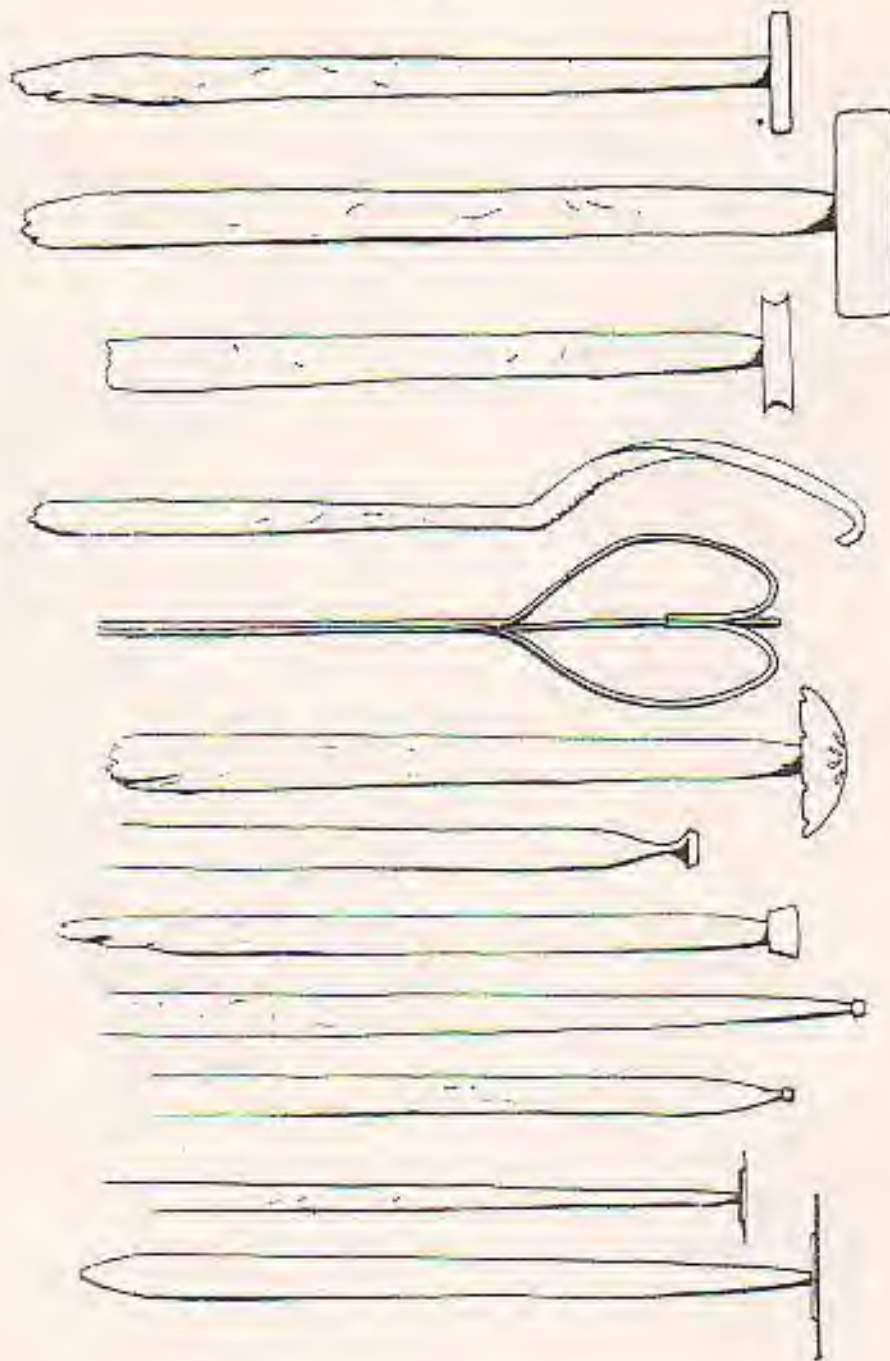


The lapidary of pearls is unique among colored stones as the pearl is a ready-made gem. Pearl lapidary includes bleaching (as all pearls are off-color when first from the oyster), dyeing, drilling, and stringing or pegging. Sometimes, when pearls get barreled with long use, they may be sent to the pearl peeler, a rare specialist who soaks the pearl in oil and literally rubs it round again. Above are shown the procedures for stringing pearls and, at the left, a 14th century pearl dealer at his inspection desk.



Jade carving is best associated with old China as that is where it was revered above all other precious things. As early as 4000 B.C. water-worn nephrite boulders were being brought in from Khotan. It was not until 1784, when the wars between Burma and China ended, that jadeite was introduced on a commercial scale. Prior to that, only a very few pieces entered China since the discovery of jadeite in Burma in the 13th century.

The working of jade was a very slow and thought-consuming art and therefore every detail was well planned out. Quartz sand and crushed garnet were used as abrasives until about 1200 A.D. when corundum was used. Diamonds were brought from India in 300 B.C. but were only used in drills and for engraving. The old processes of carving jade are shown here. As with colored stones, lapidary change came slowly with the use of carborundum as an abrasive in about 1895, then the increased use of diamonds, then the use of electrical power in 1940. Above is shown an ancient jade girdle pendant as described and pictured in the Ku yu t'u p'u, a book dating from 1092 A.D. and the oldest known work on jade.



These tools shown are those used until October 1, 1949, when the Communists took over and ended the industry. It was later realized that the jade cutting business was a large source of revenue for the new government. In 1956 they started to look for the old artisans who had worked as jade carvers, and by 1958 a co-operative was set-up — the Peking Jade Studio — in a new four-story building. By 1960 fourteen hun-

dred workers were involved in the new industry, a half of which were women. Government subsidies have been used to buy the most modern equipment. The grinders, gouges, drills and cutting wheels above are still used but are very much modified, and electrical power is used. The quality of the work is not as good as that done by the ancients because of the great speed at which the work is executed.

(41)

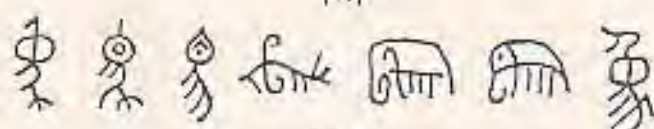


Fig. 1
Archaic Forms of the Written Symbol for the Elephant.



Fig. 2
Elephant from a Tomb of the Shang Period, about 1600 B.C.



Fig. 3
Symbol of the Elephant from Inscriptions on Bronzes of the Chou Period.



Fig. 4



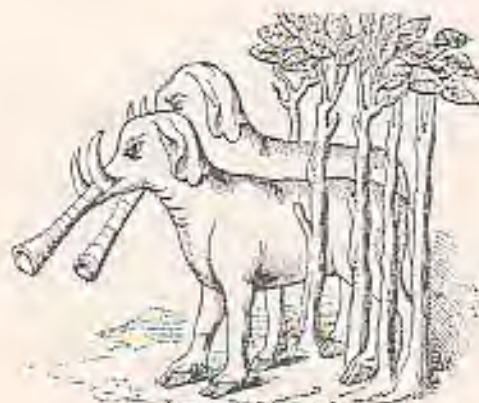
Fig. 5
Elephant from a Bronze Beaker of the Chou Period.



Fig. 6
Elephant from a Bronze of the Shang Period, applied to a Seal of Later Date.

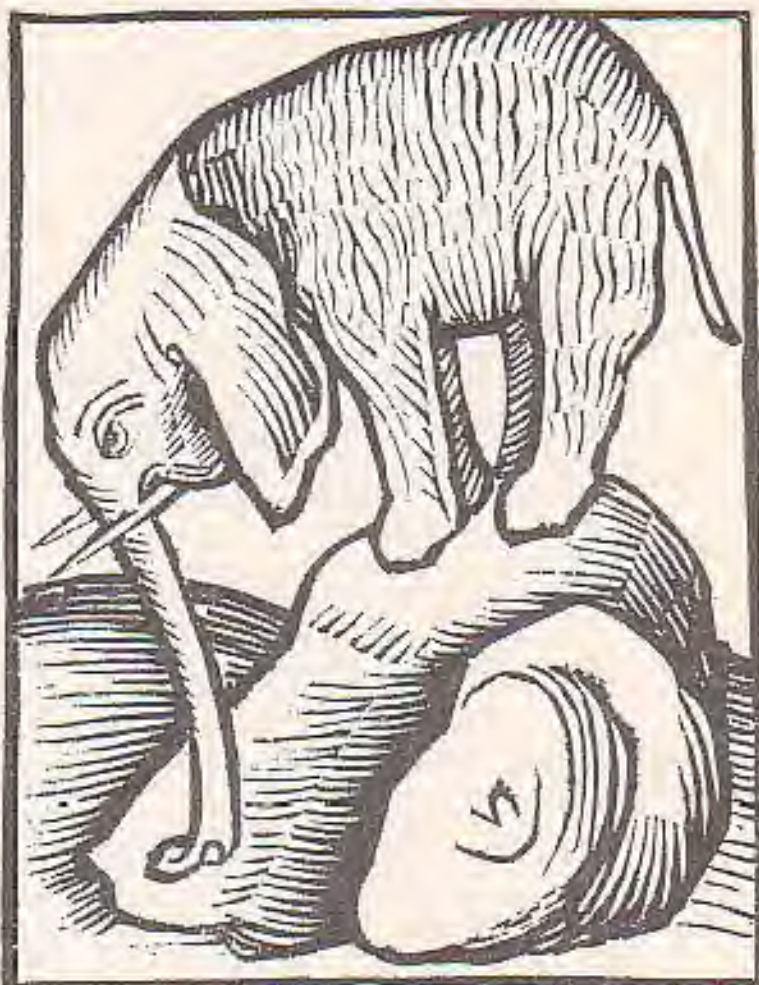


Fig. 7
Elephant Head in the Pictograph Writing of the Mo-ssu.

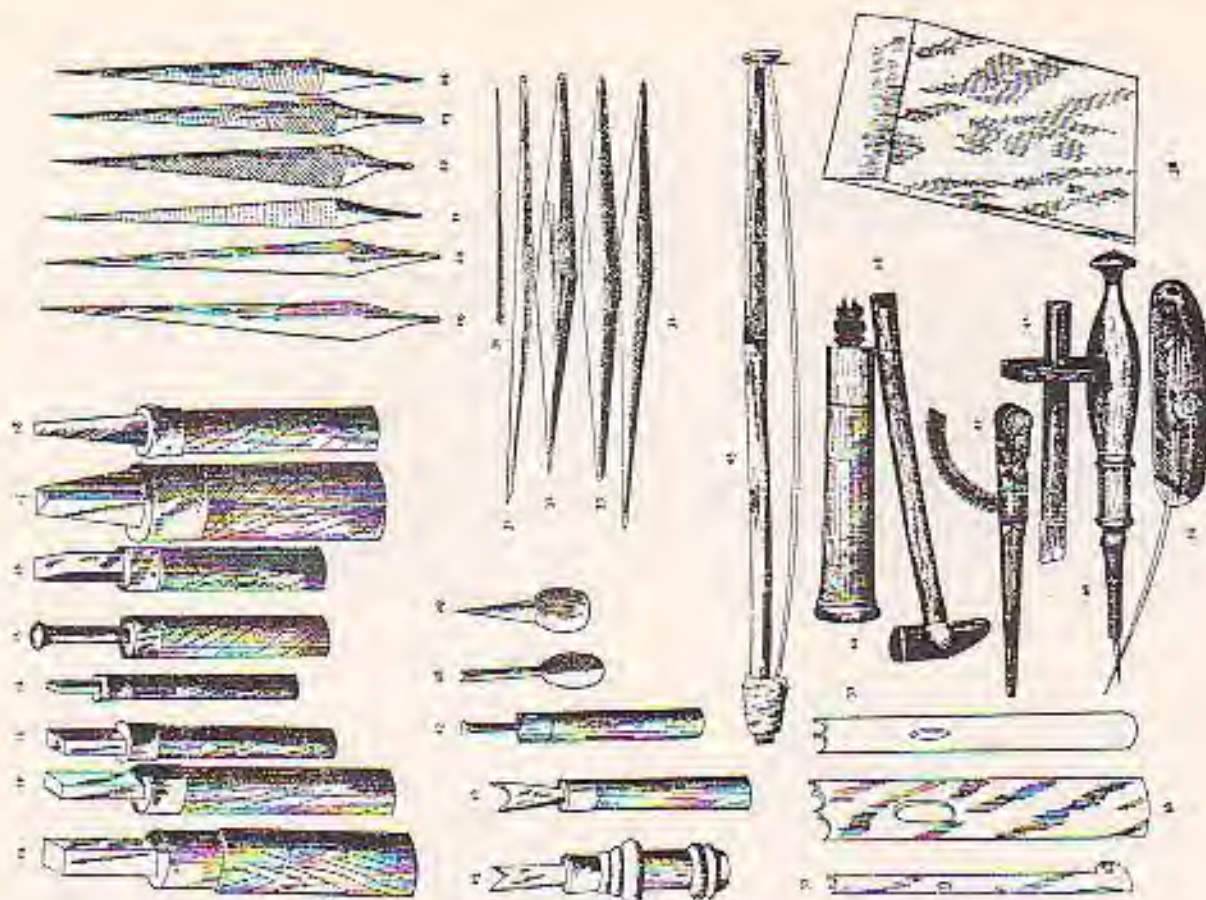


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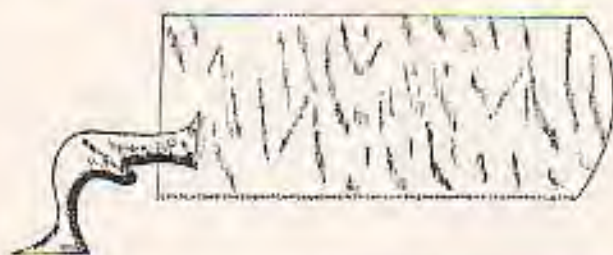
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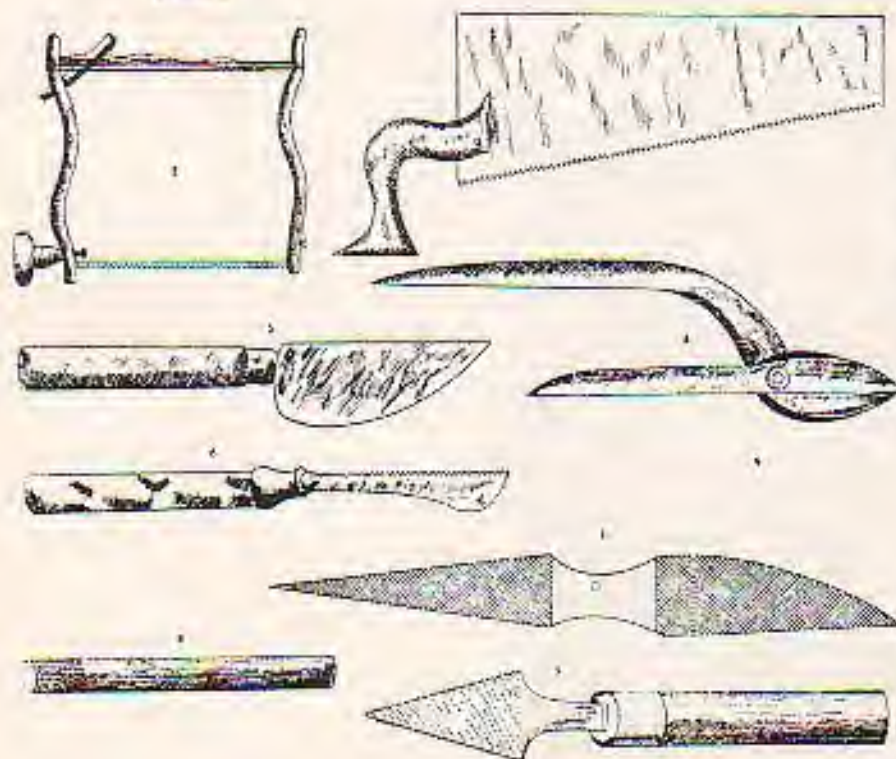
One of the least understood gem materials is ivory; more explicitly, elephant ivory. It is little known to gemologists in general that the vast history of ivory developed in three places rather than two. Carving of ivory developed independently in China (upper left shows some of the ancient Chinese symbols), in India, and in Africa. The latter two areas contributed to the ivory trade of early Europe. The plate to the left is an 11th century elephant, while above is a 15th century plate from a book on gems that mentions ivory as an organic gem.



(42)



(42)



The lapidary of elephant ivory (as well as other ivories) is one art that is very similar to wood carving. Shown here are the tools used by Hindu ivory carvers. The carving tools of the ivory lapidary have changed less than any other lapidary, yet the ivory industry is probably as old as any other gem industry.

(43)



In mining gems, it seems they always occur in the most unbearable climates with few exceptions. Here, an opal miner cuts some of his rough in the cool of the evening after a hot and hard day's work on the Australian Desert.

[44]



By far the largest source of precious coral has been the Mediterranean Sea and it still remains the main contributor. The coast of Algiers, Tunis, Corsica, and Western Italy are the main fisheries.

Many times a net was just dragged behind a boat to snag the coral. When larger pieces were desired and the sea shallow enough the coral fisherman would dive for it as shown here.



(45)

It is hard to believe that a gem could have been responsible for the opening of a continent. Around 200 B.C. Roman demand for the strange material drove them to send several large expeditions on a northern trek to reach the amber fields of Samland. The Romans engaged the locals by trade to collect great quantities of amber. In England the Romans mined tin, necessary for bronze, and later they got fresh water pearls from Scotland. This trading established the north-south trade routes that are still used even today.

(10)



The great majority of the amber found throughout history has come from the shores of the Samland coast of East Prussia near Kaliningrad where it has been hunted for at least 3000 years. At first it was used by the local natives for fuel and for its aromatic odor. It was also used in some very crude carvings because of its low hardness.

Amber was usually collected along the shores after storms had brought it up from the bottom and washed it onto the shore. Later it was dredged by long nets as shown in the first book on the amber industry (print above). Some gatherers, called "amber runners," rode horses along the shore carrying forked poles and collecting bags on their backs.

One of the few accurate early illustrations of the origin of amber is shown above right from a 15th century book on gems.



(46)



The abundant use of turquoise by peoples the world over, dating back to prehistoric times, is obvious upon a visit to any fine museum of archeology. Turquoise was mainly used by the ancients as an inlay material as demonstrated by the inlaid bronzes of China and India, the pottery of old Egypt, and the wood (top right and center) and human bones (top left) of ancient Mexico. In fact, there isn't a notable turquoise deposit known anywhere in the world that does not show evidence of prehistoric mining.

An Aztec turquoise lapidary is shown to the left.

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